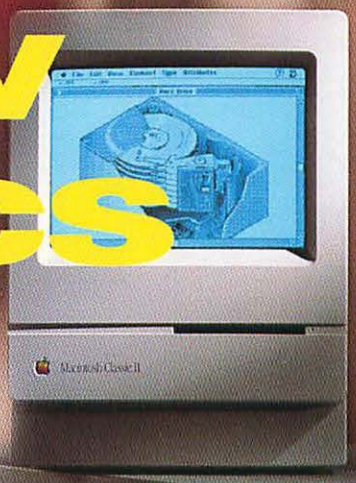
SPECIAL ISSUE: SIX NEW MACINTOSHES

MACWORLD

The Macintosh® Magazine

December 1991 $3.95 Canada $4.95

Apple's New Macs

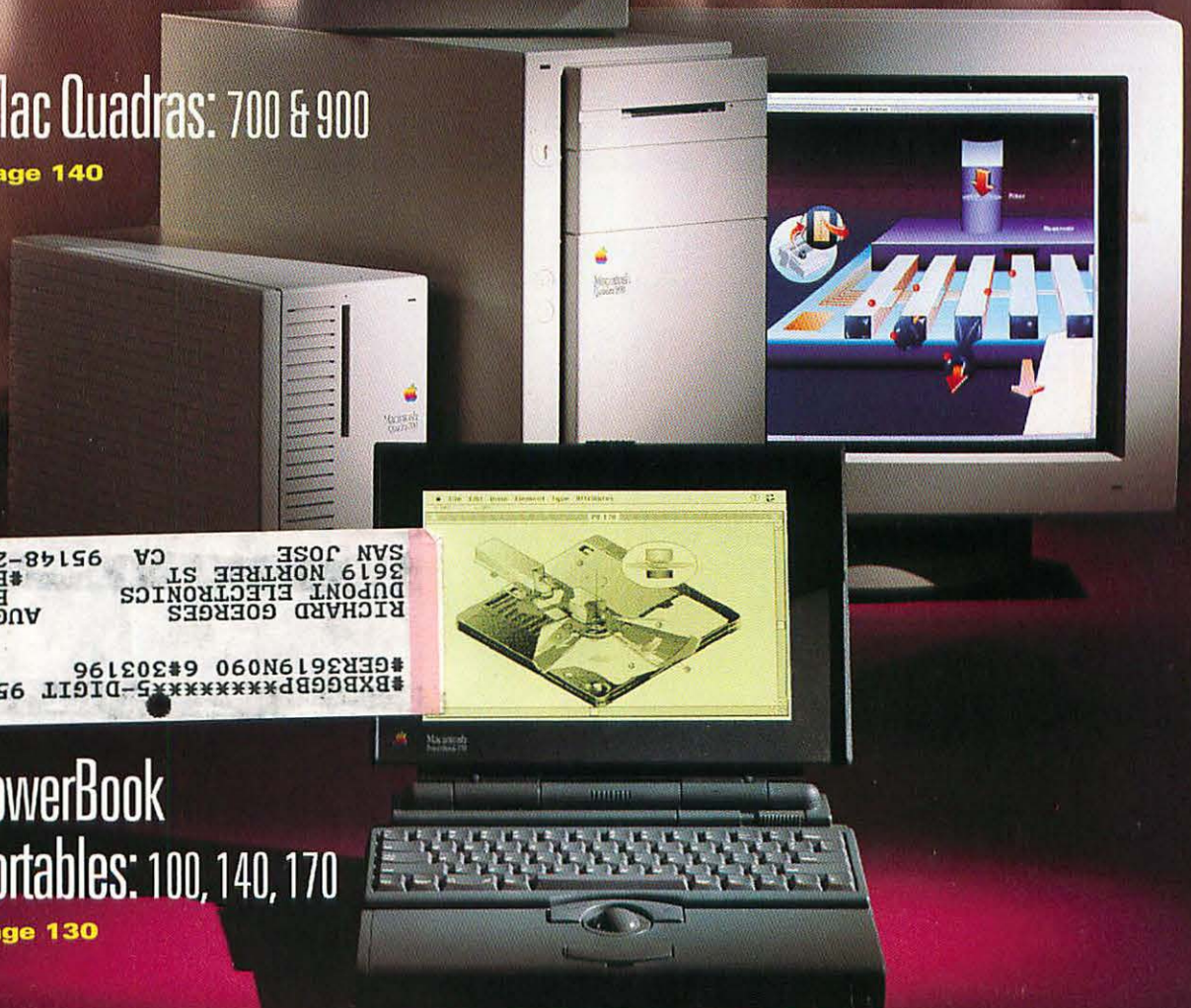


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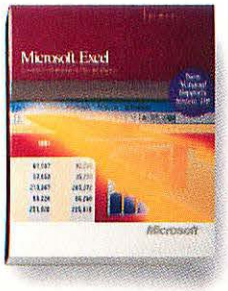


Mac PowerBook Portables: 100, 140, 170

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New Microsoft Excel of an exhaustive co



Betsy Mill put it all in perspective when she wrote to us, "I love [Microsoft] Excel as much as my microwave oven but no love is perfect."

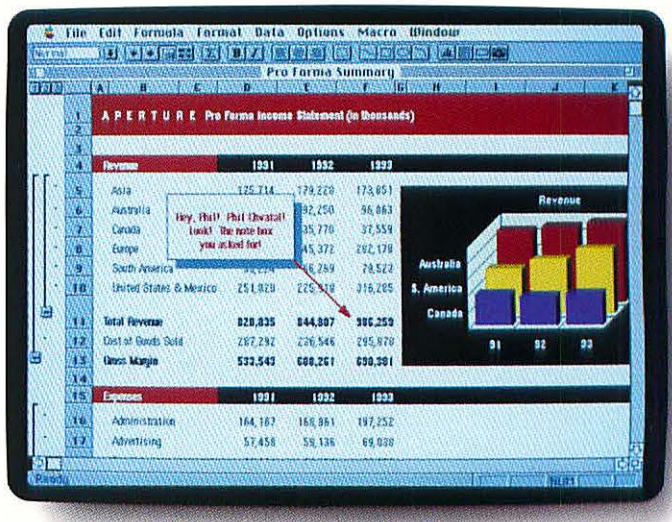
Well, Betsy, get a load of this. We think new Microsoft® Excel version 3.0 is the closest thing to perfection ever seen in a spreadsheet for the Mac®. For one good reason.

Power made easy.

The new Toolbar,™ for instance, reduces common, time-consuming tasks down to one step.

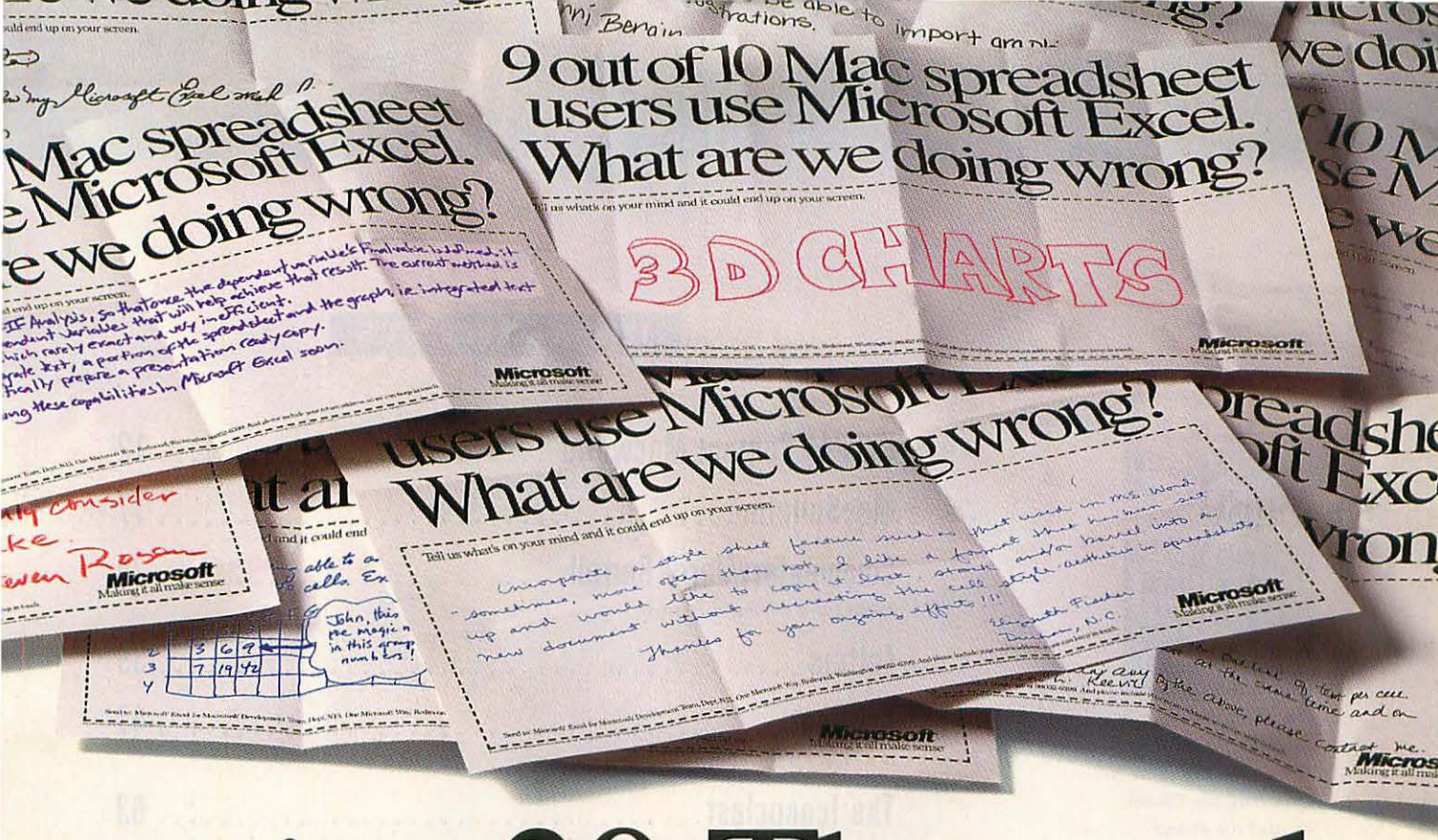
Highlight a row or column of numbers, hit the Σ button (that's Autosum™), and *voilà* – it all adds up.

Do quick, push-button formatting. Use outlining features to collapse

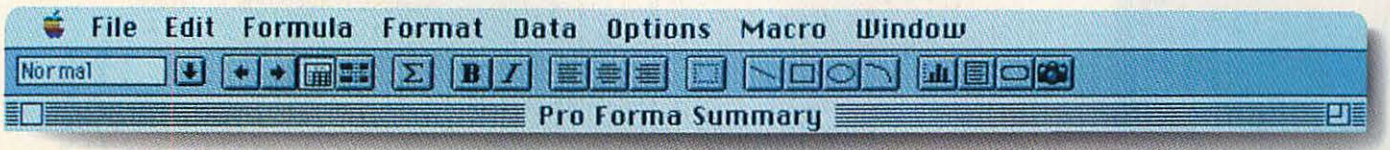


Yes, Paul, a single button now lets you access 68 chart types, 24 of which are 3-D. You can incorporate these right into your worksheet, along with text and data. And notice the outlining feature on the left? Go nuts.

Plus shipping and handling and applicable sales tax. If you are a registered user of Microsoft Excel, watch your mailbox for an update coupon. Offer good only in the 50 United States. In the 50 United States, call (800) 541-1261, Dept. Q83. For information o Microsoft Corporation. Mac is a registered trademark of Apple Computer, Inc.



version 3.0. The result respondence course.



Take a look at the new Toolbar. In one step, you can now access style sheets, outlining features, Autosum, formatting options, drawing tools, charts of all kinds and macros. Go to town.

or expand worksheets without having to create multiple files.

As for charting, we took our cue from Paul Woods, who began his letter with the salutation, "Charts, charts, charts!" Hey, Paul – check out the picture and caption for the full scoop.

Did we mention that you can consolidate up to 255 worksheets at a time, regardless of format?

Or the Goal Seek feature, which lets you put in the total you want and works backwards from there to fill in the variable you need?

Or the fact that this is the first System 7.0 application available?

Plus, you can update to version 3.0 for $129. If you acquired your current version of Microsoft Excel on or after 12/7/90, the upgrade is only $50*. Call (800) 541-1261, Department Q83, to find out more.

By the way, Bryan Larson: we said hi to Bill for you. He sends his regards.

Microsoft

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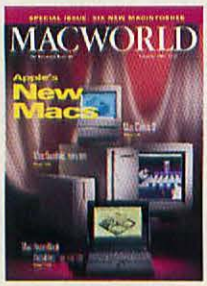
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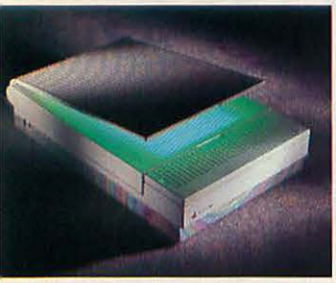
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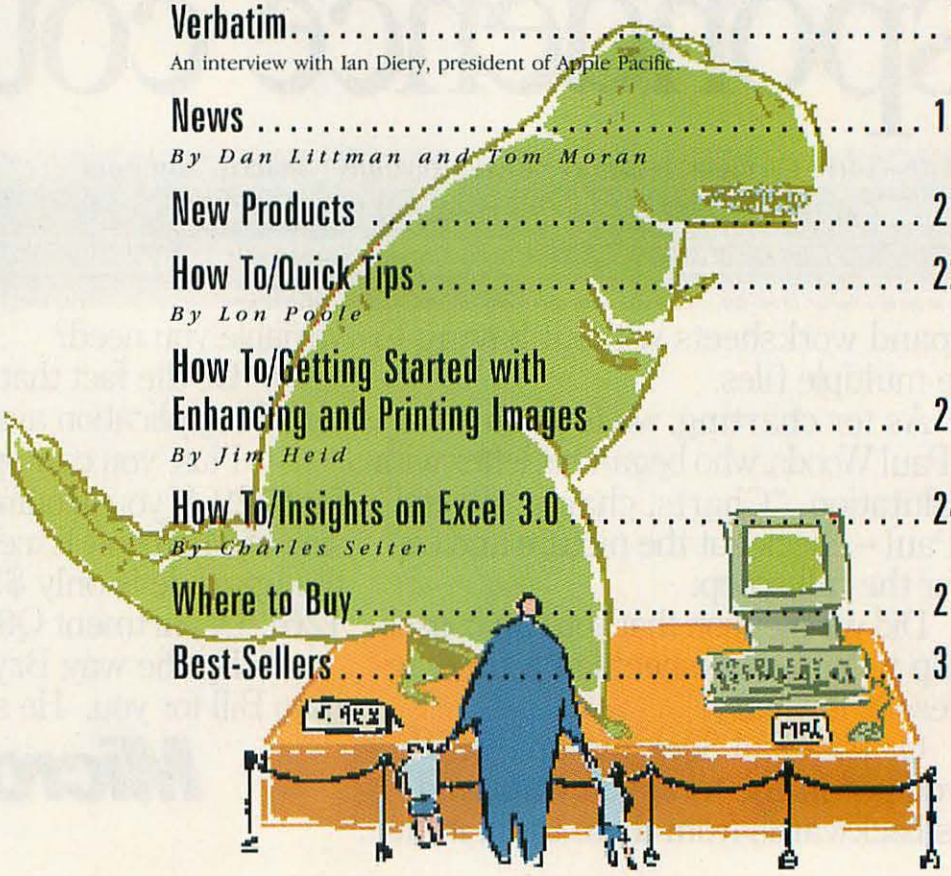
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On the Cover
Armed with six new CPUs—the high-end Quadras, the Classic II, and the PowerBook portables—Apple unleashes the next generation of Macintosh. (Photo by Mark Johann.)



In News
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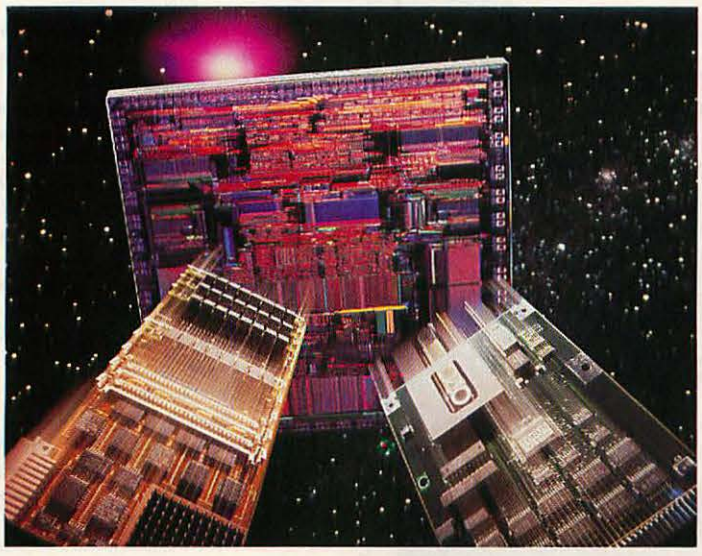
By Galen Gruman With its new PowerBook portables, Apple finally ushers in the era of notebook computing on the Mac.

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By Lon Poole For a few hundred dollars more, this Classic successor delivers twice the speed of its popular namesake, offers sound input and more RAM, and takes full advantage of System 7.



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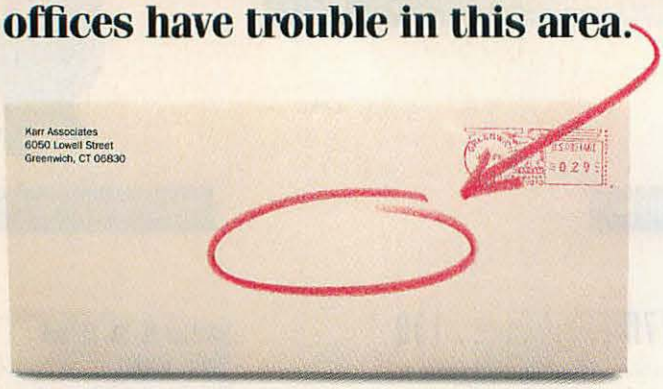
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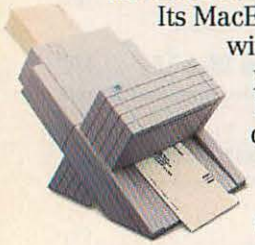
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How System 7 can give you more usable screen space

Screen space is always at a premium. Of course, you could buy a larger monitor. But that's not really the answer (you may already have a two-page monitor anyway). And then, it's just like a larger hard disk; pretty soon you want more—once again.

The real answer is to use the screen space you already have more efficiently.

System 7 can help.

Window Management Made Easy

Remember when the Mac® could only handle one document at a time? Screen space didn't seem so scarce then. The key to Mac efficiency is in better management of the windows open on your desktop. Here are some quick tips:

Finder Shortcuts They help reduce Finder clutter. You'll see them described under the question mark menu. Among them:

- Holding down the Option Key while clicking the close box closes all Finder windows.
- Holding down the Option key while opening an icon closes its window while you move to a new level.
- Command-Up Arrow opens the window that encloses the active window.

Hide 'em! Use the "Hide Others" command located in the application menu to hide windows in applications you are not currently using. This will save space and increase speed.

System 7 Utilities

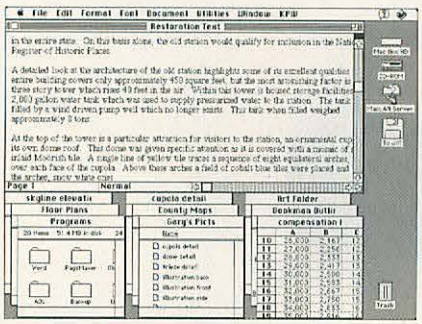
The release of System 7 has sparked the appearance of utilities designed specifically for its powerful capabilities. One of these is Kiwi™ POWER WINDOWS, a new window and document management tool.

It was designed to help you make maximum use of available screen space. Some existing applications already have "arrange windows" commands to divide your screen among documents, but invariably they are too crude or rigid to be truly useful. Worse, they are hostage to a single application.

Free Your Windows!

Using a proprietary technology called ARGO (Advanced Rectangular Graphic Organizer) Kiwi POWER WINDOWS takes screen optimization a giant step forward. It offers dozens of sophisticated preset "Window Layouts" (arrangement styles). You can also create custom window layouts. This built-in flexibility will suit any personal preference and situation.

These window arrangement capabilities are system-wide, allowing you to control windows in all your applications. You'll find it easy to learn and use, because you use the same interface in every program.



With KPW, efficient automatic window arrangement layouts such as this one are only a menu selection away.

Power Made Simple

It gets even better: with a single command, Kiwi POWER WINDOWS will allow you to arrange all windows in several applications at a time, facilitating cut-and-paste or comparison jobs between programs.

One of the drawbacks of using the Finder's new "Hide Others" command is that you can no longer jump to a window simply by clicking it: it's hidden. Kiwi POWER WINDOWS solves the problem: with it, you can activate any window from any application with a single menu selection.

Designed with a simple interface, but intelligent behavior, the program deals elegantly with complex situations such as multiple monitor setups, or changes in the number or size of the attached monitors.

Find Out More

Making the best use of your screen is only one of Kiwi POWER WINDOWS' advanced capabilities. With its Work Set feature, it manages documents as cleverly as it manages windows.

For more details, call the Kiwi Software information line at 1-800-321-5494. And if you mention that you saw this advertisement in Macworld, you just might get lucky: Every 50th caller will win a free copy of the program. One call per person, valid while quantities last.

Kiwi POWER WINDOWS is available from your software supplier, or directly from Kiwi Software. Suggested retail price $79.95

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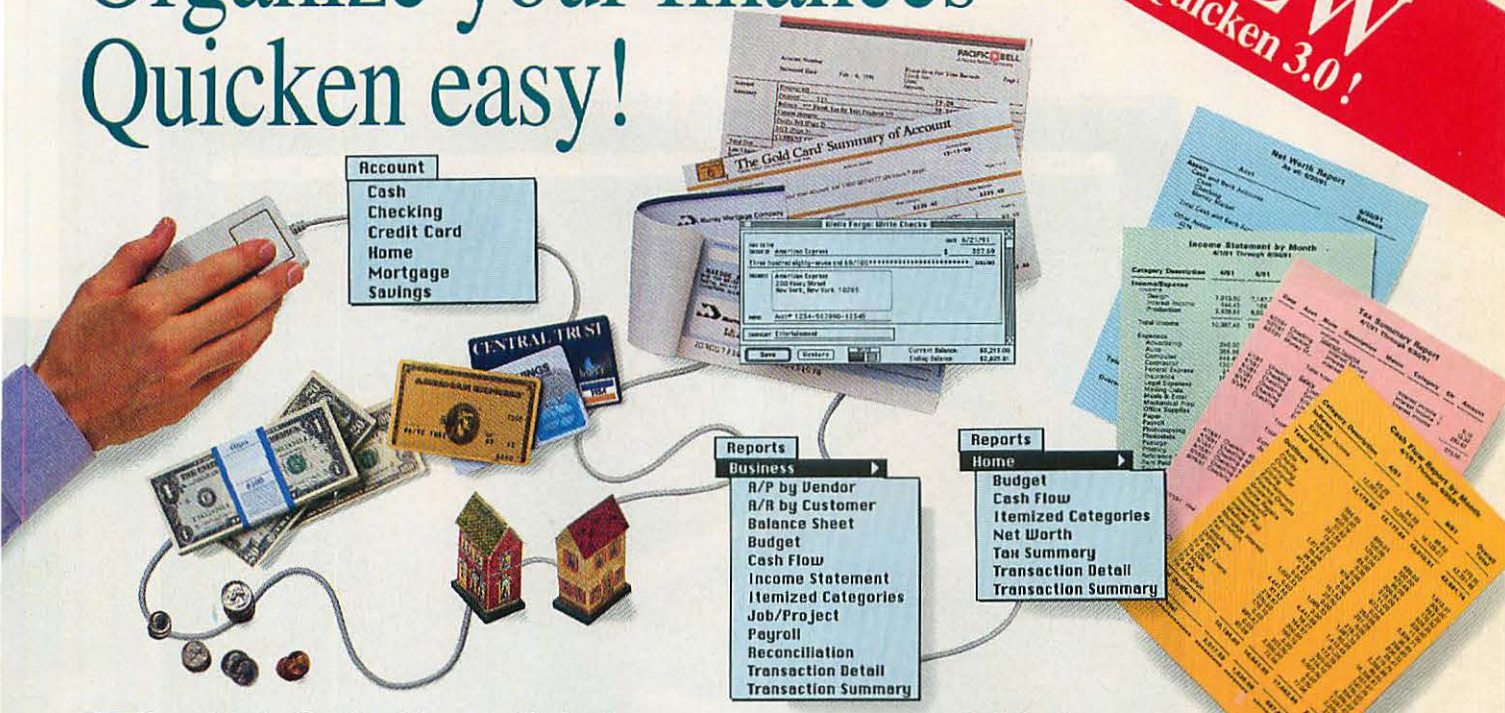
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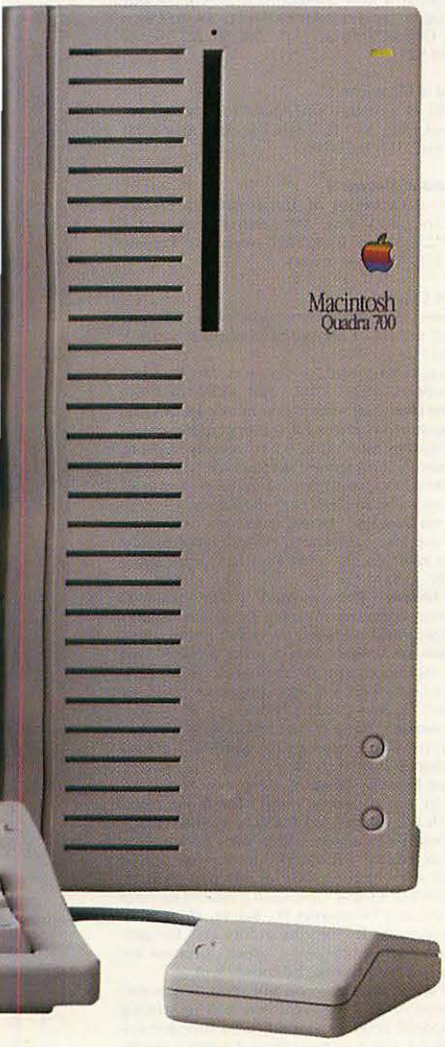


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Puts	12/28/84	100	$3.00	$209.25	$30,209.25	01/09/85	$4.25	$425.25	$42,573.75	$12,064.50
Calls	01/29/85	100	$4.38	$236.00	$43,980.00	02/11/85	$5.63	$267.50	$55,982.50	$12,002.50
Puts	03/12/85	100	$2.88	$209.25	$28,959.25	03/19/85	$4.00	$218.75	$39,781.25	$10,822.00
Calls	04/09/85	100	$3.50	$209.25	$35,209.25	05/20/85	$6.75	$401.25	$67,190.75	$31,980.50
Calls	06/26/85	100	$2.38	$209.25	$23,959.25	07/01/85	$3.13	$209.25	$31,049.75	$7,081.50
Calls	07/18/85	100	$5.00	$248.75	$50,248.75	07/23/85	$3.75	$411.25	$37,200.75	($12,960.00)
Puts	08/13/85	100	$3.25	$209.25	$33,709.25	08/26/85	$2.75	$275.00	$27,990.75	($5,918.50)
Puts	09/16/85	100	$2.25	$209.25	$22,709.25	09/26/85	$2.63	$209.25	$24,790.75	$2,081.50
Calls	11/05/85	100	$4.88	$245.00	$48,995.00	12/10/85	$6.63	$697.50	$193,552.50	$146,567.50
Calls	01/27/86	100	$2.25	$209.25	$22,709.25	03/04/86	$3.50	$425.00	$168,225.00	$75,615.75
Calls	03/12/86	100	$4.75	$241.25	$47,741.25	04/22/86	$5.63	$387.50	$95,862.50	$48,121.25
Calls	05/21/86	100	$4.50	$233.75	$45,233.75	06/[illegible]	$7.75	$391.25	$97,108.75	$51,875.00
Calls	08/06/86	100	$4.13	$222.50	$41,472.50	09/05/86	$10.75	$401.25	$127,618.75	$85,946.25
Calls	09/17/86	100	$4.50	$233.75	$45,233.75	[illegible]	$6.88	$305.00	$68,445.00	$23,211.25
Calls	11/25/86	100	$4.13	$222.50	$41,472.50	[illegible]/86	$4.88	$245.00	$48,995.00	$7,522.50
Puts	01/02/87	100	$2.38	$209.25	$23,959.25	02/[illegible]/87	$1.00	$209.25	$2,790.75	($21,168.50)
Calls	01/08/87	100	$6.75	$301.25	$68,001.25	03/03/87	$29.00	$967.50	$295,262.50	$227,461.25
Calls	03/05/87	100	$3.50	$209.25	$35,209.25	03/[illegible]	$2.94	$209.25	$29,165.75	($6,043.50)
Calls	03/31/87	100	$4.75	$241.25	$47,741.25	04/[illegible]	$2.38	$346.25	$82,153.75	($34,612.50)
Calls	05/06/87	100	$3.75	$211.25	$37,711.25	05/[illegible]	$2.50	$209.25	$22,290.75	($15,420.50)
Puts	05/15/87	100	$4.88	$245.00	$48,995.00	06/[illegible]	$3.38	$209.25	$24,576.25	($24,418.75)
Calls	06/17/87	100	$4.25	$226.25	$42,726.25	06/[illegible]/87	$2.38	$346.25	$82,153.75	$39,427.50
Calls	07/31/87	100	$3.13	$209.25	$31,459.25	08/06/87	$2.38	$248.75	$49,751.25	$18,292.00
Puts	09/16/87	100	$5.88	$257.50	$58,007.50	09/[illegible]	$1.00	$509.45	$106,399.55	$48,392.05
Puts	09/09/87	100	$4.38	$236.00	$43,980.00	09/[illegible]	$0.63	$209.25	$36,949.75	($7,030.25)
Calls	10/08/87	100	$7.75	$330.13	$77,[illegible]13	10/[illegible]	$29.00	$2,[illegible]	$967,242.50	$889,439.37
Calls	11/10/87	100	$5.00	$248.75	$50,248.75	11/[illegible]	$2.00	$209.25	$29,165.63	$6,256.00
Calls	11/13/87	100	$3.00	$203.75	$[illegible]3,203.75	11/[illegible]/87	$2.38	$209.25	$23,549.75	($11,663.00)
Calls	12/15/87	100	$2.88	$209.25	$[illegible]1.25	12/[illegible]/87	$2.50	$353.75	$84,646.25	$53,187.00
Puts	02/11/88	100	$4.00	$218.75	$40,[illegible]8.75	03/[illegible]/88	$1.00	$209.25	$25,790.75	($14,237.75
Puts	03/25/88	100	$4.38	$236.00	$43,[illegible]6.00	04/05/88	$2.63	$267.50	$55,982.50	$12,023.25
Puts	05/16/88	100	$4.63	$254.[illegible]	$47,[illegible]7.50	05/16/88	$0.00	$209.25	$52,243.75	$5,756.25
Puts	06/06/88	100	$4.63	$254.[illegible]	$47,[illegible]7.50	06/27/88	$1.00	$209.25	$149,451.25	$101,466.50
Puts	08/01/88	100	$4.00	$218.75	$40,[illegible]8.75	08/[illegible]	$2.63	$209.25	$26,640.75	($14,178.00)
Puts	08/10/88	100	$4.00	$218.75	$40,218.75	08/[illegible]	$7.38	$209.00	$73,430.00	$33,211.25
Puts	10/05/88	100	$3.25	$209.25	$33,709.25	10/[illegible]	$0.63	$209.25	$19,790.75	($13,918.50)
Calls	10/18/88	100	$5.50	$263.75	$[illegible]3.75	11/21/88	$3.00	$209.25	$34,616.25	$39,352.50
Calls	01/09/89	100	$7.13	$312.50	$[illegible]2.50	02/09/89	$2.00	$209.25	$179,341.25	$137,790.75
Calls	02/17/89	100	$6.25	$286.25	$[illegible]6.25	02/22/89	$0.63	$209.25	$52,243.75	($10,548.50)
Puts	02/23/89	100	$3.75	$211.25	$[illegible]1.25	03/03/89	$0.88	$245.00	$48,505.00	$10,793.75
Calls	03/06/89	100	$5.63	$267.50	$[illegible]7.50	03/17/89	$0.38	$209.25	$83,400.00	$26,082.50
Calls	03/29/89	100	$6.38	$290.00	$[illegible]0.00	04/20/89	$0.50	$209.25	$107,078.75	$43,460.25
Puts	05/19/89	100	$2.63	$209.25	$[illegible]9.25	06/[illegible]/89	$1.00	$209.25	$17,290.75	($9,168.50)
Calls	07/06/89	100	$5.75	$271.25	$[illegible]7.50	08/[illegible]/89	$25.00	$673.25	$249,326.75	$191,555.50
Calls	08/24/89	100	$3.63	$209.25	$36,[illegible]9.25	09/25/89	$0.63	$242.50	$60,997.50	$24,440.25
Calls	09/28/89	100	$4.13	$222.50	$41,[illegible]2.50	10/09/89	$1.13	$436.25	$112,963.75	$70,591.25
Calls	12/29/89	100	$4.13	$222.50	$41,[illegible]2.50	01/[illegible]/90	$0.63	$346.25	$82,153.75	$40,681.25
Puts	01/09/90	100	$5.50	$263.75	$52,[illegible]3.75	01/[illegible]/90	$0.63	$488.75	$129,511.25	$76,846.25
Puts	01/16/90	100	$8.75	$361.25	$87,[illegible]1.25	01/[illegible]/90	$14.88	$545.00	$140,205.00	$52,343.75
Puts	02/21/90	100	$4.25	$226.25	$42,726.25	02/[illegible]/90	$2.94	$186.88	$29,100.13	($13,530.13)
Calls	03/16/90	100	$6.63	$297.50	$66,547.50	03/[illegible]/90	$10.00	$398.75	$99,601.25	$33,053.75
Puts	04/12/90	100	$5.50	$263.75	$55,263.75	04/16/90	$0.25	$346.25	$82,153.75	$26,890.00
Puts	04/19/90	100	$5.93	$248.75	$50,248.75	04/27/90	$10.00	$398.75	$99,601.25	$49,352.50
Puts	05/08/90	100	$4.75	$241.25	$47,741.25	05/14/90	$0.25	$676.25	$169,823.75	$122,082.50
Calls	06/22/90	100	$6.63	$297.50	$66,547.50	06/25/90	$3.63	$297.50	$36,042.50	($30,505.00)
Puts	08/07/90	100	$7.88	$335.00	$79,085.00	08/24/90	$22.25	$766.25	$221,723.75	$142,640.75
Calls	01/17/91	100	$12.88	$405.00	$159,235.00	01/18/91	$19.00	$648.75	$189,301.25	$30,066.25
Calls	01/21/91	100	$10.63	$417.50	$166,667.50	02/13/91	$32.00	$1,058.75	$310,941.25	$212,273.75
Calls	04/16/91	100	$3.13	$192.50	$31,442.50	04/18/91	$9.50	$303.75	$94,616.25	$63,173.75
Puts	04/29/91	100	$5.38	$260.00	$54,010.00	04/26/91	$7.00	$308.75	$69,691.25	$15,681.25
Puts	05/02/91	100	$5.25	$256.25	$52,756.25	05/15/91	$11.50	$443.75	$114,556.25	$61,800.00
Calls	06/27/91	100	$4.88	$218.75	$40,218.75	06/28/91	$3.63	$207.50	$36,842.50	($4,176.25)
Puts	07/08/91	100	$4.75	$241.25	$47,741.25	07/10/91	$3.38	$209.25	$33,358.00	($14,191.25)
Calls	07/18/91	100	$1.38	$140.00	$13,890.00	07/19/91	$2.75	$181.25	$27,310.75	$13,420.75
Puts	09/04/91	100	$4.63	$237.50	$46,407.50	09/11/91	$7.50	$323.75	$74,676.25	$28,180.25
										$3,484,135.67

76.19% Accurate: Above is a chart of OEX trades from December 28, 1984 to September 11, 1991, based on the signals generated by the Right Time-Index Program™. By following the signals generated by the program, the rules in the manual and starting with just a small amount of capital ($30,209.25) your profits would have been over $3,400,000.00.

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They laughed when database, but every



Okay, so maybe I'm not in MIS, but I grinned and loaded FoxBASE+/Mac.

The next day, I showed them a sample of their PC inventory database with not just how much of anything we had, but with pictures showing exactly what it looked like.

I ran their dBASE sales analysis program (using a couple of new Mac screens I whipped out) as they watched FoxBASE+/Mac scream through the numbers.

And then I showed them the kinds of reports they could get, using data stored in Fox or dBASE IV/III+ files on the PC.

You could have heard a pin drop.

Then they were all over me with questions, so I just handed them the FoxBASE+/Mac manuals and smiled.

Besides not being in MIS, I'm not a professional programmer, so you can tell how easy FoxBASE+/Mac is.

For the inventory system, I just used



I brought in my own one's smiling now.

FoxBASE+/Mac to read the database files they had on the PC (it reads Fox and dBASE IV/III+ files directly). I added a memo field into which I cut and pasted pictures that our DTP department had for our customer literature. Then I used the MacDraw-like screen painter to create a great color Mac output screen.

The sales analysis was easy, too. I had to create new screens but FoxBASE+/Mac ran the rest of the dBASE III+ program just fine. (It typically runs as much as 95% of standard FoxBASE+/PC and dBASE III+ code with no changes.)

And I built the reports I showed them from scratch. With no programming at all.

If you're looking for a better way to manage your data, call Fox Software and ask for their free demo. It limits the number of records you can store, but is the full program, so you can check it all out for yourself on your applications.

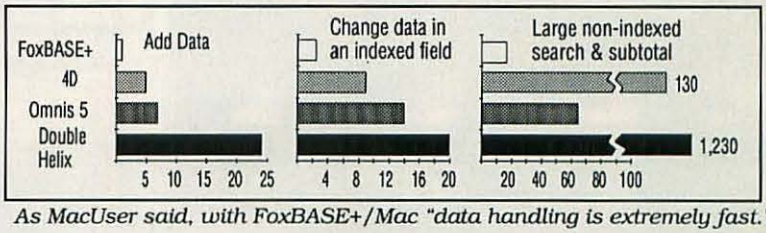
Around here, MIS has been pretty busy the last few weeks. They've hooked up Macs and PCs on an Ethernet network and our information and data processing systems are looking great.

They're building Hypercard-like applications I see people using all over the place.

Accounting likes all of this because the single-user version lists for $495, and the unlimited Multi-User version is only $695.

And even the PC programmers are happy. I hear them talking about things like the great trace and debugging facilities, adding XCMDs and XFCNs, the dBASE-like programming language, System 7 compatibility, full file and record locking in the multi-user version, and how FoxBASE+/Mac is "so astoundingly fast for a Mac."

Everyone seems to be laughing more now, too.



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MacBulletin

Apple and IBM Finalize OS and Multimedia Agreements

On October 2, Apple and IBM signed final contracts for five technical initiatives that may affect future computing, from the desktop to enterprise-wide systems. The first, Power PC, makes Motorola co-designer, with IBM, and manufacturer of RISC processors for systems from IBM, Apple, and others. Apple plans a Power PC Macintosh. The second initiative, PowerOpen, is a version of Unix that will have a Mac interface and will run Unix and Mac applications. It will be licensed to all comers. The third initiative, Enterprise Networking, calls for IBM and Apple to share technologies for integrating systems from many vendors across large organizations. The fourth, Kaleida, is a joint venture between Apple and IBM to develop multimedia software in new standard data types to increase consumer acceptance of multimedia. The fifth initiative, a joint venture called Taligent, focuses on the previously announced hardware-independent, object-oriented operating system that both companies' hardware will use. The operating system will be based mostly on Apple's current Pink project. Kaleida and Taligent will both license their software to anyone. All the products are at least several years off.

PageMaker, FreeHand Upgraded

Aldus's flagship products are following the trend with support for System 7's publish and subscribe, balloon help, and TrueType. FreeHand 3.1 will convert TrueType to editable outlines; create variable-width strokes with a new pressure-sensitive freehand tool; and save in PICT2 format. FreeHand's price remains $595. PageMaker 4.2 is the first version to support the add-on modules called Aldus Additions, which Aldus announced early this year. It will ship with several Additions including a drop-cap creator, a column-depth balancer, and a page sorter that is similar to Persuasion's slide view. Version 4.2 will be able to interrupt a screen redraw and paste multiple copies of an object at user-specified offsets. Its price remains $795. Aldus is at 206/622-5500.

Down on the Ant Farm

Maxis is following up its thinking-Mac's simulations, SimCity and SimEarth, with SimAnt, a game where you join your ant comrades in a communal struggle to conquer a suburban backyard. Some ants act as soldiers fighting off rival ant colonies; some spend their time protecting their queen or gathering food; and others have to deal with hungry spiders, a dog, and a suburbanite armed with a water hose and big feet. SimAnt will be distributed for $59.95 by Brøderbund at 415/492-3200.

Jasmine Enters Chapter 7 Bankruptcy

After a long struggle, Jasmine Technologies has converted its bankruptcy proceedings from Chapter 11 to Chapter 7, which means the company will be liquidated. Customers who are owed products or repairs will be able to contact the trustee for the case, who had not been appointed at press time. (Watch this space.) The company's law firm said Jasmine's main phone number would not be working by the time this reaches print.

The New DiskFit

Dantz Development has reabsorbed its DiskFit backup utility, which SuperMac was publishing, and plans to replace it with DiskFit Pro. Under System 7, DiskFit Pro supports AppleEvents and can create a folder of aliases of the backup set that remains on the active volume. Pro, which will list for $125, lacks some of the features in Dantz's high-end Retrospect, such as the ability to back up to tape. Dantz is at 510/849-0293.

Common Carrier

Apple is leading a drive to develop a new text format called Rich Text (RTXT) that will allow Macs; Unix machines; and IBM PC–compatibles running DOS, OS/2, and Windows to exchange text files and retain formatting such as tab positions, embedded pictures and sounds, and underlined text. RTXT will be especially useful in E-mail. Most major software developers are contributing to the RTXT design.

Solutions' AT&T Solution

Solutions has announced gateways from Microsoft Mail and CE Software's QuickMail into AT&T's EasyLink, with support for X.400 as well as EasyLink addresses, U.S. and worldwide telex and Mailgram, and shore-to-ship communications. GlobalGate lists for $395 for one server and five users. Solutions is at 802/865-9220.

Silicon Graphics to License 3-D Graphics Library

Silicon Graphics, the leader in the critical area of interactive 3-D graphics software, said it will license

(continues)

its IRIS Graphics Library to any company that wants it. Silicon Graphics' recent alliance with Compaq and Microsoft had earlier caused it to drop a potential Mac-compatible version of the product, according to a company representative, but the licensing announcement means that Apple or a third party can now port the software to the Mac.

RasterOps Stock Takes a Dive, Truevision Merger Off

RasterOps Corporation's stock fell 21 percent after the company predicted lower earnings. RasterOps cited the recession as part of the cause, and reported difficulty in selling its products in Europe, a major part of its market. Earlier the company had said that its announced merger with Truevision would not occur.

RasterOps Drops Prices, Extends Warranties

Until December 31, RasterOps will sell its display adapters for the Classic and the LC at 50 percent off. The boards must be bought at the same time as a RasterOps 19-inch or 21-inch monitor or an Apple 15-inch portrait display. The company has also extended its warranty to three years on all its products. RasterOps is at 408/562-4200.

GCC Sets Printer Rebates

To stay competitive with Apple's holiday rebates (see *Macworld News*), GCC Technologies is offering rebates on its page printers through January 5. The rebates are $100 on a BLP Elite, BLP II, or BLP IIS PostScript printer, and $50 for a PLP II or PLP IIS QuickDraw printer. GCC is at 617/890-0880.

High-Capacity Hard Drives for the Macintosh Quadra

Hewlett-Packard has introduced a series of four hard drives that range from 422MB to 1.355GB and are designed to work with the Macintosh Quadra 900 (see "Macintosh Quadras: Power but No Pizzazz," this issue). The HP C2249M, a 422MB internal drive, and the HP C2451M, HP C2452M, and HP C2453M external drives feature a high-speed SCSI-2 interface. The drives have an average access time of about 20ms. Hewlett-Packard can be reached at 800/752-9000.

What's in a Frame?

ACIUS developed a 4th Dimension application for internal use to automate publishing its catalog of 4D developers with Frame Technology's FrameMaker. Now ACIUS plans to market the application. A user first assigns FrameMaker style tags to the fields in a 4D database. Then 4D exports the contents of the database, which can include graphics, in FrameMaker's interchange format; FrameMaker reads in the file and automatically interprets and applies the embedded style tags. Frame Technology is also developing a read-only viewer for FrameMaker documents. People creating documents can embed hypertext links in viewer documents and add dialog boxes that the reader can use to navigate. At press time, neither application had a name or a price. Frame Technology is at 408/433-3311. ACIUS is at 408/252-4444.

Simulations in a Fishbowl

The Edison Calculator Company is shipping an on-screen 2000-digit scientific calculator and developing a series of simulations that appear in a calculator-size window and are controlled with calculator buttons. Simulations under development include the Battle of Bull Run, which lets users change parameters such as weaponry or tactics to see the results; a Mandelbrot fractal generator; a Scott Joplin piano player that lets users modify Joplin's music; a Black Monday simulation that puts users in the pit of a stock exchange with access to the crashing prices of real stocks; and a special calculator for dealing with infinite numbers. All will list for less than $50. Edison is at 516/471-5753.

The Automatic DiskDoubler

Hard drives are getting cheaper, but they're still not free. Salient Software is developing an INIT that compresses files on a hard drive to save room; the INIT works without requiring the user to do anything. The INIT, code-named Crush, will decompress files in memory instead of on the hard drive, which is faster and doesn't consume space on the drive. With Crush installed, graphics applications that preview images will still work, as will utilities such as Gofer and On Location that read the contents of unopened files. Crush will list for less than $100. Salient is at 415/321-5375.

The PowerBook Synchronizer

Dantz Development's Intertie is designed to synchronize the contents of the hard drives on your portable and your desktop machine. Intertie keeps track of changes to files; when the two drives are connected on AppleTalk, Intertie copies the newest version to the drive with the outdated files. Intertie also works with daisy-chained drives. The program will list for $149. Dantz is at 510/849-0293.

PSI Offers Network Fax Modem

PSI Integration has begun shipping its Comstation Four, a combination 9600-bps fax and 2400-bps Hayes-compatible modem that supports up to ten users over Ethernet or AppleTalk. The network fax modem lists for $699. Contact PSI at 800/622-1722.

Router to the Cosmos

Engage Communication is shipping its SyncSatellite, an AppleTalk-compatible router that uplinks Mac files to commercial satellites for global broadcasting. Engage also publishes software that manages the sending and receiving of files and provides security. Price depends on configuration. Engage is at 408/688-1021. ■

WHEN WAS THE LAST TIME A DRAWING PROGRAM MADE YOUR PALMS SWEAT, YOUR PULSE RACE, AND YOUR HEAD SPIN.

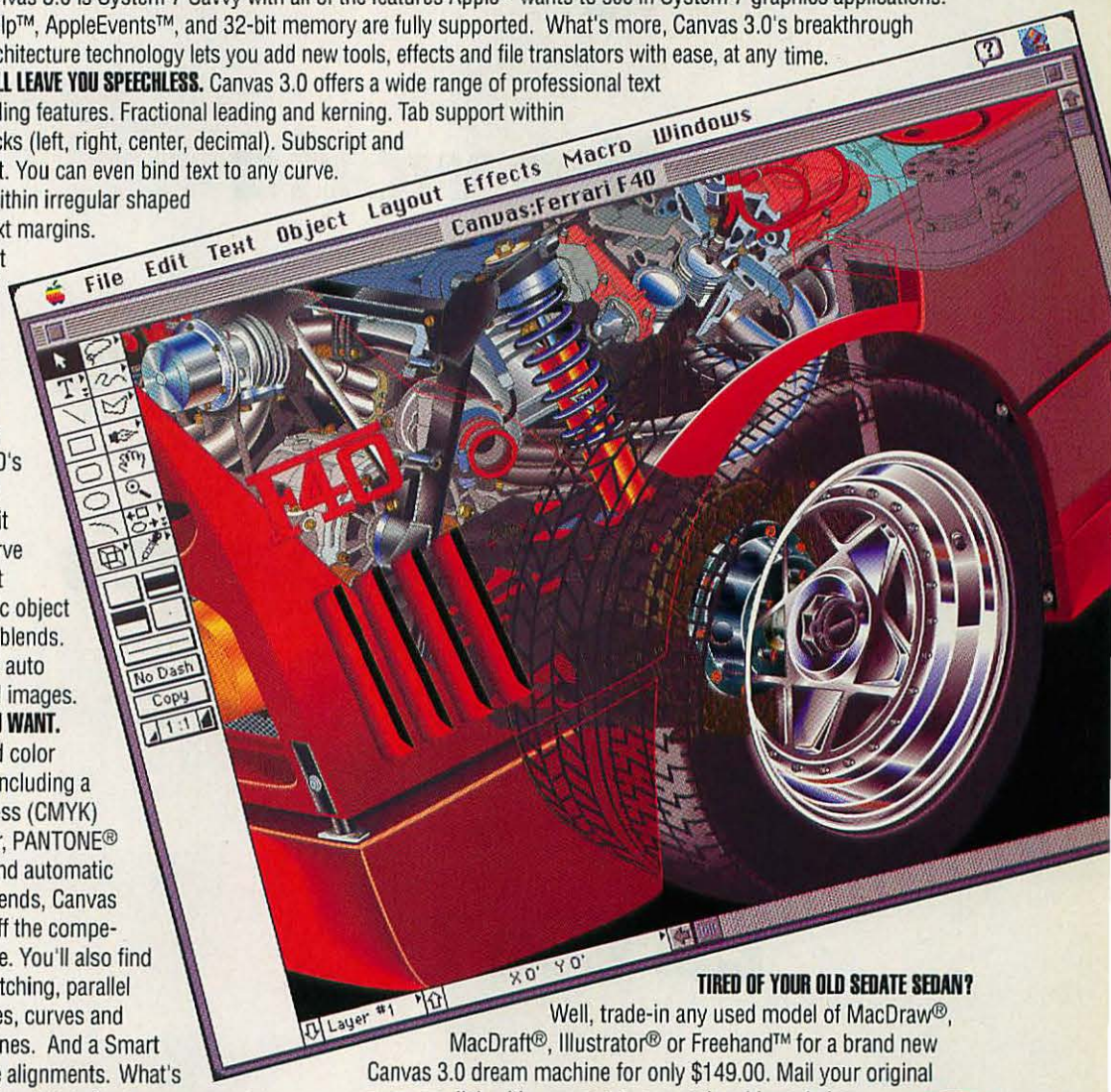
UNLEASH THE AWESOME POWER OF CANVAS 3.

Fasten your seat belt and get ready to take the incredible new Canvas 3.0 for a spin. Its exceptional performance and nimble handling make Canvas 3.0 the hottest precision drawing program on the market. And its formidable list of major enhancements puts it miles ahead of anything else on the road.

CRUISE INTO THE FUTURE TODAY. Canvas 3.0 is System 7 Savvy with all of the features Apple® wants to see in System 7 graphics applications. Publish & Subscribe, Balloon Help™, AppleEvents™, and 32-bit memory are fully supported. What's more, Canvas 3.0's breakthrough Open Architecture technology lets you add new tools, effects and file translators with ease, at any time.



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NOTHING HANDLES CURVES BETTER. While other drawing programs make you draw Bézier curves by "connecting the dots", Canvas 3.0's freehand tool lets you create any curve by simply drawing it. And it gives you unparalleled Bézier curve editing power -- from multi-point selection and editing to automatic object conversions, combinations, and blends. You even get centerline auto tracing of scanned images.



GO WHEREVER YOU WANT. With enhanced color capabilities, including a built-in process (CMYK) color separator, PANTONE® color support, and automatic gradient fills and blends, Canvas 3.0 is blowing the doors off the competition. But it doesn't top out there. You'll also find technical features like custom hatching, parallel lines and curves, and dashed lines, curves and borders. Automatic dimension lines. And a Smart Mouse™ drawing aide for precise alignments. What's more, there are new built-in file translators for important multi-platform formats like EPSF, TIFF, CGM, DFX™, IGES, and Illustrator®.

TAKE THE CHECKERED FLAG. Why drive some sedate sedan when you can own the road with the new Canvas 3.0.? It's incredibly easy to use -- and the list price of just $399 simply adds to the thrill. So, take a deep breath. Buckle up. Double click. And unleash the awesome power of Canvas 3.0. You're in for the ride of your life.

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Bobker's Dozen Best
MacUser, December 1990

"Good software can make using a hard disk a joy. Cirrus drives include an outstanding set of utilities."
Macworld, May 1989

"Quantum has also developed an even faster drive mechanism, the LP52S, which offers a capacity of about 50 megabytes ...the La Cie Tsunami 50 uses this mechanism."
MacUser, April 1991

"The better looking zero-footprint drives come from La Cie...La Cie also makes the sporty Cirrus and Tsunami compact drives. If you are value conscious, you'll be hard pressed to beat La Cie."
Macworld, November 1990

"The La Cie Tsunami 50 uses a distinctive love-it-or-leave-it case designed for vertical placement by itself or for horizontal stacking of multiple drives. La Cie sells larger-capacity drives with zero-footprint cases."
MacUser, April 1991

"The [La Cie Tsunami 50's] case is durable, power-on as well as drive-activity indicator lights are provided, and bundled software is excellent."
MacUser, April 1991

"The La Cie ZFP400 is an affordable hard disk drive with an actual capacity of 423 MB. Good support."
MacUser, December 1990
★★★★★

"Now here's an interface to get excited about (Silverscanner). La Cie's Photoshop plug-in offers more options than almost any other software, and it's all clearly labeled and easy to understand."
Publish, August 1991

Ask them.

"La Cie products were my favorites."
Macworld, September 1989

"The Silverscanner 300dpi scanner comes complete with its own image-capture software."
Macworld, August 1990

"The well-designed La Cie Tsunami 50 is an external, 50MB SCSI hard disk drive based on the new, fast Quantum LP52S mechanism. This was the second-fastest drive overall in our April '91 lab report."
MacUser, April 1991
★★★★

"La Cie offers the leading combination of software and performance."
Macworld, March 1990

"[The La Cie 1000 MB ZFP Plus] provides good performance with the Silverlining 5.27 SCSI driver. Software provides password-protection and data-encryption functions."
MacUser, July 1991

"The La Cie 600R Magneto-Optical erasable optical drive is fast. Silverlining formatting software provides good SCSI performance."
MacUser, November 1990

"...the choice is clear: if you don't need a large scanning bed or a transparency option, buy the La Cie Silverscanner. It is one of the least expensive models under review, and its scans are among the best."
Macworld, June 1991

"If you are looking for a comprehensive hard disk utility that might boost your disk's performance, you should take a look at Silverlining. This handy utility is a hard disk formatter, driver installer, partitioner, and optimizer."
MacUser, December 1989

"The Silverscanner is also fast, and it comes with a one-year warranty and a good selection of software, including one of the more flexible Photoshop drivers around."
Macworld, June 1991

"Only one company, La Cie, has a hard partitioning utility that lets you resize partitions without losing data."
Macworld, November 1989

"Sure winners, the lightweight, silent and inexpensive Cirrus drives from La Cie come with first-rate utility software...the cream of the crop."
Macworld, May 1989

"The best termination solutions, however, come with drives from La Cie..."
Macworld, March 1991

World Class Awards (7): (1) Hard Drive — Under 80MB, (2) Hard Drive — 80MB to 160MB (1st place), (3) Hard Drive — Over 160MB (1st place), (4) Optical Drive (1st place), (5) Best Customer Support — Hardware, (6) Removable Media — Drive, (7) Scanner — Color
Macworld, September 1991

"The Cirrus 84 is a sleek, quiet 84MB hard disk drive. Five-year warranty."
MacUser, February 1990
★★★★½

"The best performance, the most flexible installer software and good attention to support and hardware details."
MacWeek, January 1990

"La Cie's Silverlining is a powerful formatter — it even has built-in timing loops that determine the optimum installation settings."
MacUser, April 1991

Why should you plunk down your hard-earned money on a La Cie hard drive?

Well, the folks at Macworld, MacUser, MacWeek and other computer publications have been giving out some excellent reasons for years. With the consensus being that La Cie offers some of the hardest-working, fastest, most reliable drives you can own. Hard drives that continue to win design awards from both industrial *and* computer publications.

But if you'd like a few more reasons to buy a La Cie, consider that all of our hard drives up to 400MB come with the heart of a lion — in this case a built-in Quantum drive mechanism. It's about the fastest, most reliable, most respected mechanism around. With effective seek times as low as 8ms.

You're covered by our 2-Year Limited Warranty† which says that if, within two years, anything goes wrong with your drive's Quantum mechanism, we'll repair or replace it within 48 hours absolutely free. Plus, you can add an additional 3 years to your warranty for just $1 per megabyte.*

And because we're backed by the resources of Quantum, you can count on us to provide high-quality mechanisms, components — plus customer service and support — for a long time to come.

Need more reasons to buy? Take a close look at our product listings. To order, or for even more information, call us at 800-999-0143. After all, when the subject is La Cie, we always love to talk.



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- Portable, compact and easy to use
- 2½ inch drive
- Comes with one PocketDock™ cable

80MB PocketDrive	**$599**
40MB PocketDrive	**$449**
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- High-speed back-up capabilities
- Perfect for the high capacity needs of large databases, CAD applications, desktop publishing and more

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Tape Drives



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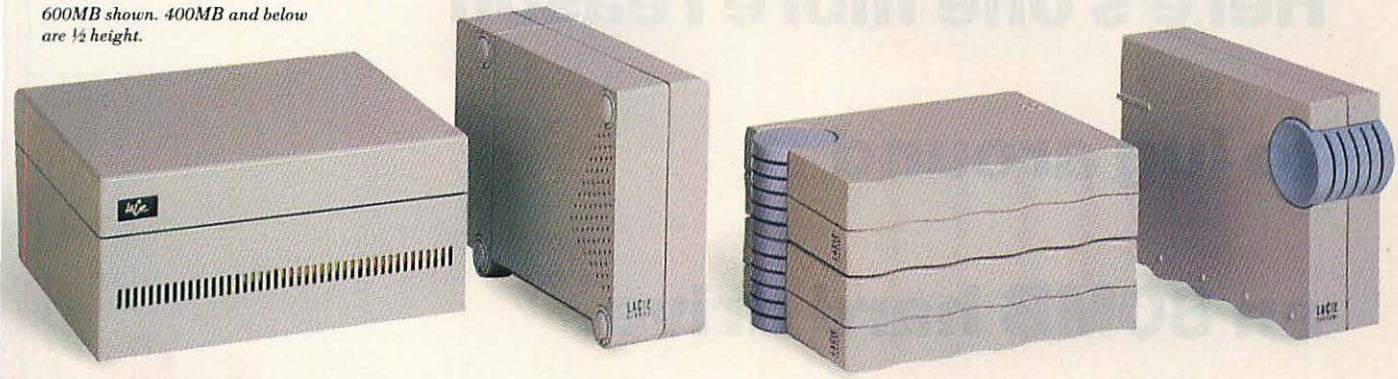
†Restrictions apply. Please contact La Cie for complete warranty information.
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"La Cie hard drives include the best software we tested."
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"...The Good Housekeeping Seal. I'm now taking the safer course of buying from corporate-owned companies such as Quantum-backed La Cie..."
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If you think La Cie's new 80MB PocketDrive™ comes with a big advantage, look closer.

It's a very small one.

Because until now, no one's ever loaded as much capacity into such a compact, portable and easy-to-use drive as La Cie.

Portability with a purpose.

So maybe you're a skeptic. And you're thinking that PocketDrive, being as small as a billfold, must somehow skimp on performance.

Wrong.

For starters, with 80MB of storage* it's plenty powerful, letting you store and transport more files and applications than you can shake a stick at.

And when you consider its all-new 2½ inch drive technology, fast 19ms seek time, plus the quietest operation this side of a mime troupe, it's clear that PocketDrive really gives you maximum performance in a minimum of space.

*Also available with 40MB.

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You've heard that compact drives are a pain to connect and disconnect? Not anymore. Instead of plugging directly into the back of your Mac,® PocketDrive connects to a cable called PocketDock.™ No more fumbling around at the back of your computer, connecting, disconnecting and reconnecting everything. And when you buy an additional PocketDock cable, you can leave *one* cable at work and *one* at home for even faster set up.

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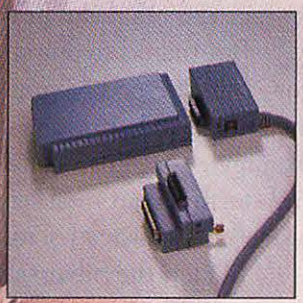
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"The choice is clear. . . buy the La Cie scanner."
Macworld, June 1991

"My recommendation would be to go with La Cie Silverscanner and Photoshop. . ."
MacDigest, December 1990

"La Cie's Photoshop plug-in offers more options than almost any other software."
Publish, August 1991

Now that you've seen what they've said, see what they mean.

When the subject is scanners, seeing is believing.

So, to see what the critics are raving about, we thought it wise to show you just how good La Cie looks compared to the competition — in this case, the Microtek 600ZS.

The result? When you compare the two images side by side just like the experts did, La Cie's Silverscanner™ beats Microtek.

Fair and square.

The best hardware for the money.

When Macworld recommended buying the La Cie scanner, they must have had some very good reasons in mind.

Maybe it's because we offer the finest, most reliable hardware in the industry.

Or that the Silverscanner delivers the kind of superior performance usually found in machines costing thousands more.

Or the fact that you get high-quality, true-to-life color. Sharp, accurate scans. Production-quality halftones with excellent detail in those troublesome shadow areas. Plus easy-to-use image controls, with full functions such as user-selectable halftoning, color dropout, gamma correction, brightness and color correction. All right at your fingertips.

Faster previews, faster scans.

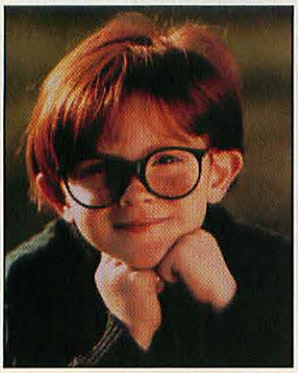
If you've ever used a scanner, you know what it means to wait for the entire preview to finish before you can make any adjustments to your scan settings. It's a process that can burn up a lot of your time.

But thanks to our single dynamic preview window, you can modify your scanner functions *during* the preview. That means no more waiting around for the preview to finish before making your scan settings and starting your final scan. Suddenly, your previews take seconds instead of minutes.

In fact, the Silverscanner is so fast — and will save so much time — you can often finish your scans *before* other scanners are even finished previewing.



Microtek Scan



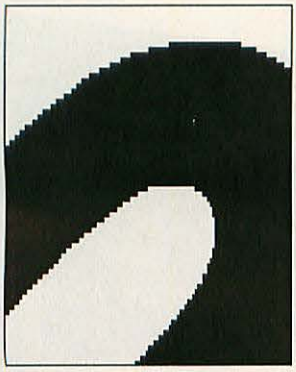
Silverscanner



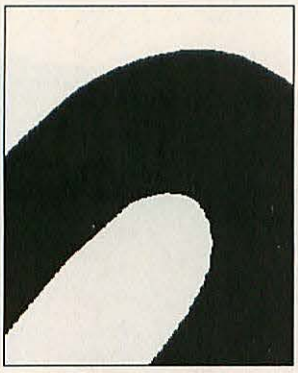
Microtek Scan



Silverscanner



Microtek Scan



Silverscanner

For this comparison, we used a Microtek 600ZS and a La Cie Silverscanner. All scans were done at default settings with no corrections. The color images were separated using Adobe Photoshop. The top of the letter "C" in the La Cie logo was scanned at the maximum dpi setting (600 dpi on the Microtek 600ZS and 1200 dpi on the Silverscanner) and was enlarged so you can more easily see the difference. See the La Cie logo below scanned at 1200 dpi at actual size. You compare, you see the difference, the La Cie Silverscanner — better color, more shadow detail and smoother line art.

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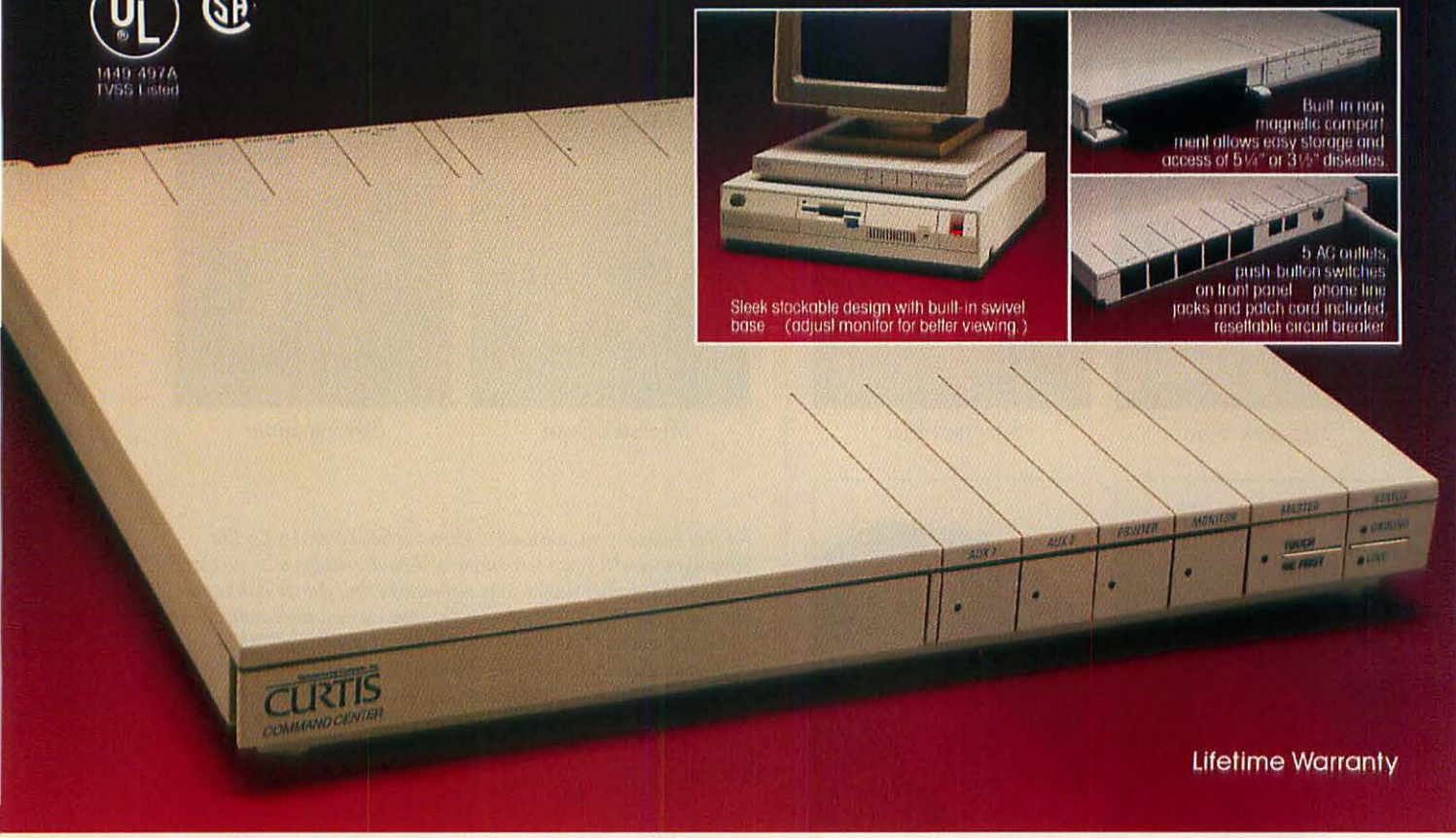
La Cie Silverscanner: 16.8 million colors; 256 smooth shades of gray; production-quality line art; up to 1200 dpi — all in a single pass.

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Circle 20 on reader service card



Of Personal Computers and Manufacturing in the 21st Century

WHERE ARE THE TOOLS FOR A RENAISSANCE MAN?

BY JERRY BORRELL

High-pitched shrieking assaults your ears as you step through the door onto the shop floor. From the ceiling, 20 feet overhead, bright-yellow high-pressure hoses descend in looping coils to workbenches holding dozens of complicated cutting instruments. Small mountains of curlycued plastic strands litter the floor. Some of the machines I know—drills, lathes—but others I don't recognize, with digital displays, knobs, and dials. Underlying the shriek the instruments make as they cut is the lower-pitched, steady whine of electric motors. As soon as you've become accustomed to the noise, smells attack you—odors from chemicals used to bathe the machines and the parts that they are milling out of plastic.

Although it appears you've entered a factory, the floors are too clean, the machines too shiny, the light fixtures too modern for that. This is Hoefer Scientific Instruments of San Francisco, a world leader in scientific-instrument production that epitomizes new-age, turn-of-the-millennium industry. What economists call light manufacturing. Here computer-controlled devices create the instruments with which genetic engineers, biochemists, and technicians explore the limits of biochemical research. It's manufacturing that uses sophisticated plastics and composite materials to produce exotic devices. This manufacturing takes place in an elegant office-factory built to Hoefer's specifications in one of those rapidly gentrifying warehouse districts typical of once-seedy inner-city areas throughout the country.



PHOTOGRAPHS BY ROBERT HOLMGREN

Michael Whitesides with a robotic milling machine.

How Industry Is Changing

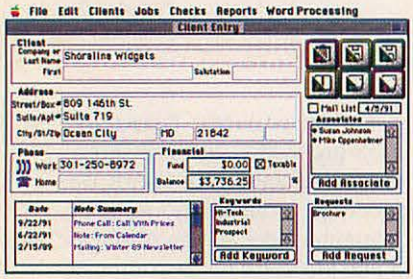
The work at Hoefer is representative of how industry worldwide is changing—in semiconductor fabrication, ceramics production, textile manufacturing, and automotive and aerospace engineering. Increasingly designers use computer-aided design (CAD) for input into processes run by computer-aided manufacturing (CAM). Hoefer uses a specific type of CAM, called computerized numerical control (CNC). The company's designers create drawings for new instruments on their computers. These drawings are translated to CNC programs used to drive large robotic milling machines that are able to produce the convoluted parts for new instruments out of solid pieces of plastic.

Today, there remains the need to translate between the two-dimensional CAD drawings and the robotic milling machines used to create parts for the instruments. Someone has to determine just how the powerful, multidimensional computer-operated machine tools will mill, cut, or "sweep" through solid materials to

(continues)

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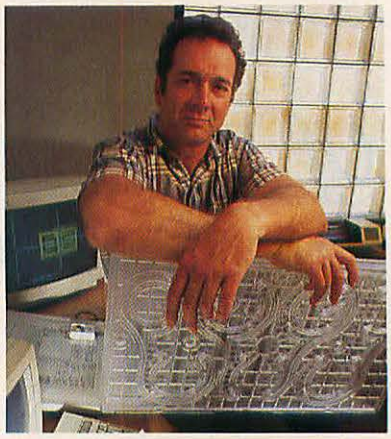
create the parts that Hoefer then assembles to make its products.

Michael Whitesides, whose office is near the shop floor, seems larger than life from the moment you meet him. Well over 6 feet tall, with forearms that bulge with the sort of strength you might expect from a man who stands for many hours each day in front of a huge machine. Despite appearances, Whitesides does not stand at some forge or lathe wrestling with heavy metal machinery. He is a research machinist, and his machine is a personal computer. With it he creates CNC programs that drive the vast robotic devices outside his office, devices that cut at plastic in three dimensions to create the wonderfully convoluted parts for the complicated instruments that the company sells.

Whitesides is a Renaissance man. Not in the sense we mean in popular culture, that of a glorified dilettante with varied interests, but in the sense of a craftsman of centuries ago. One of those artisans in glassmaking, metallurgy, chemistry, masonry, and other fields whose inheritance we see today in a vaulted ceiling, a finely wrought navigational instrument, or a mechanical clock. Whitesides is one of those individuals who bring new technology or ideas to bear on processes, resulting in significant change in how society and commerce function.

Until just after the Second World War it was artisans like Whitesides who converted a draftsman's drawings into three-dimensional parts on high-speed lathes and milling machines. These artisans were considered by some to be the most highly skilled workers of the twentieth century. It was exacting, dangerous work requiring years of practice to develop proficiency. Some old-timers lament the loss of these craftsmen to computer-controlled robotic devices that require no benefits, never drop parts, and never break a sweat trying to carve smooth surfaces from solid blocks of material.

But today there is little hope that an artisan could produce parts as sophisticated as those demanded by industry. For example, the small turbine rotor used in automobile turbochargers was designed with CAD/CAM tools that allow designers to work in up to five dimensions or axes. And it's companies using such CAD, CAM, and CNC tools, at the hundreds of manufacturers like Hoefer Scientific, that will determine whether American industry will be competitive. They will determine whether the United States will be one of the twenty-first century's leaders in manufacturing processes, or will be a consumer of products built by others.



Whitesides will keep working on his PC clone.

The Mac and Manufacturing

All of which leads me to how I came to write this story. I am a sometime follower of how technology and industry are being affected by computers, and I learned that Whitesides uses CAD/CAM products designed for the IBM PC, which is not unusual considering that IBM PC or PC-clone software has dominated the desktop CAD market for nearly a decade. But when I learned about the work that Hoefer did, I was intrigued. This seemed the perfect opportunity to examine how the Macintosh stacked up against the IBM PC. I approached a (now former) director at Apple and Mike McConnell of SuperMac with the idea of providing Whitesides and Hoefer with a Macintosh IIfx and an 8•24 GC graphics board. Other companies, including Adobe Systems, T/Maker, Ashlar, and Gibbs and Associates, contributed software. We initiated a three-month study to determine how the Mac would compare to the PC. So, last summer several boxes of equipment, some photographers, Billy Haisman of

(continues)

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Premier Manufacturing Solutions, and I became visitors to Hoefer.

Novice to Experienced User

In our first few meetings Whitesides demonstrated all of the initial enthusiasm of everyone I have ever seen using a Mac. Score one for the Mac, because of its operating system's personality—the interface, the way the Mac talks to users through dialog boxes, small aesthetic touches on the desktop and in the Finder, the Apple menu bar: all the things that Microsoft is building into Windows but that at one time uniquely defined the Mac and converted millions of users.

Almost immediately Whitesides took to the Mac, producing his monthly departmental status report in MacWrite II. He had never used a word processor on the Intel 80386-based PC clone on which he creates CNC programs. The Mac made his monthly report easy. Score two for the Mac, and support for Apple's traditional argument that engineering professionals do more on their Mac than just scientific/engineering tasks.

Then Whitesides began to explore PixelPaint Professional, Illustrator, and Canvas. Neat programs, he reported, but not really what he needed, so he progressed immediately to Ashlar Vellum. Whitesides easily learned how to create and manipulate 2-D geometry with Vellum, which he found to be a very efficient and friendly drafting package that nicely supports the CNC CAD package he uses, but less powerful and advanced than AutoCAD—the equivalent modeling package on his PC.

Finally, after training with the Gibbs system, Whitesides began to develop CNC programs based on the geometry he had created in Vellum. And this is where, sadly, the good news ceases. Whitesides began to realize that what I had promoted as the top-of-the-line Mac was only equivalent in performance to his 386 PC. The Mac renders prettier pictures, but that is a minor aspect of what he does. In terms of drawing lots of lines on the monitor, the two machines are just about the same. And the quality of the lines on the PC display are . . . better. In terms of the software, Whitesides has strong feelings about Vellum and respect for the Gibbs system, but the latter (while easy to use) does not have the same ability to use multiple connected geometric segments for the construction of tool paths that PC-based PowerCAM has, making the Mac-based system as a whole more time-consuming to use.

Bottom Line

The bottom line for Whitesides is why switch to a Mac? For pretty pictures? The performance is equivalent, the graphical user interface nice, but so what—the interface is coming to the PC as Windows. And finally, the feature set of the Mac software is not as rich as the one he is already using and familiar with. There was simply, after three months of dogged use (about

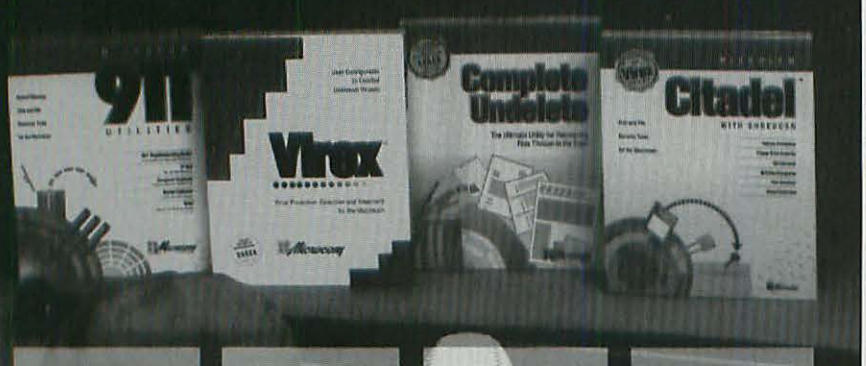
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half of his working time), no reason to switch.

I must have looked depressed when Whitesides finally voiced that opinion, because he told me that I shouldn't be discouraged, that it was very ambitious for me to have expected that the Mac could displace a computer with an established base of applications built up over ten years.

But I was depressed, because just as surely as Jacquard's union of punched cards with mechanical looms gave us one basis for modern computing, so industry will bring together computers with manufacturing processes to change our society. And after a decade of missteps in the CAD market, Apple today is not a player. And the Mac, a machine of enormous promise, will probably not be the machine at the center of the mechanical-electronic revolution.

New Models May Help

Perhaps there is hope in Apple's latest machines, the Quadra line (based on Motorola's 68040) that Apple is so hopefully promoting as a competitor in the workstation market (see "Macintosh Quadras: Power but No Pizzazz," in this issue). The Quadra models are powerful machines, the most powerful computers Apple has built to date. They incorporate many innovations: from faster NuBus architecture and built-in video and Ethernet, to faster hard drive access and more-advanced custom and semicustom semiconductor chips on the system board of the computers. The Quadras represent continuing evolution in personal computers, not a new generation; an incremental improvement in performance over the Mac IIfx, not a manyfold increase.

It is not Apple's hardware but third-party software that will make the Mac strong in emerging markets. As desktop publishing proved to be the strength of the Mac, CAD has been its weakest area of development, despite the great improvements in 3-D CAD. There are many reasons for this.

The first reason is the aging software architecture of QuickDraw. QuickDraw lacks basic primitives for CAD and design software, primitives such as bezier curves and irregular polygons. And QuickDraw is wholly lacking in support for three-dimensional graphics, and it is lacking in support for more-advanced two-dimensional drawing models.

Second has been Apple USA's peregrine attention and lackluster support of third-party CAD developers. Many of us watched over the years Apple's pitiful work with VIDI, then Versa Corporation, Generic Corporation, then Autodesk. Not only has Apple been unsuccessful in the CAD realm, but also it has never successfully developed engineering-analysis products beyond what MacNeal-Schwendler (a design-and-analysis software company) has been able to do on its own. Apple has never given

(continues)

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P2000+, 2100	18 Pin	Grappler 9 Pin	1
P2400	18 Pin	Grappler 9 Pin	1
AT&T			
AT&T 450	Daisy	None	
470 Series	9 Pin	Grappler 9 Pin	5
495	Laser	Grappler LX/LS	9
570, 571	9 Pin	Grappler 9 Pin	1
Blaser			
Star 2	Laser	Grappler LX/LS	9
Brother			
1109	9 Pin	Grappler 9 Pin	2,11
1209,1509,1709	9 Pin	Grappler 9 Pin	1
M-1909, M-1809	9 Pin	Grappler 9 Pin	1
1724	24 Pin	Grappler LX	6
HL-8	Laser	Grappler LX	9
HR Series	Daisy	None	
M-2518, 4018	18 Pin	Grappler 9 Pin	1
TwinWriter	9 Pin	Grappler 9 Pin	1
Canon			
BubbleJet 10e	InkJet	Grappler LX	
A-60		None	
CIE America			
LaserWrite	9 Pin	Grappler 9 Pin	1
Centronics			
PS210,PS220	9 Pin	Grappler 9 Pin	1
C.Itoh			
1550S+NLQ	9 Pin	None	
C-210, C-215	9 Pin	Grappler 9 Pin	1
C-310, C-315	9 Pin	Grappler 9 Pin	1
C-715	24 Pin	Grappler LX	7
C-815	24 Pin	Grappler LX	8
CI-2500	9 Pin	Grappler 9 Pin	5
CI-4000	9 Pin	Grappler 9 Pin	1
D10-40, F10-55	Daisy	None	
Jet-Setter	Laser	Grappler LX/LS	9
Lips 10+	Laser	Grappler LX/LS	9
ProWrtr Jr.+	9 Pin	Grappler 9 Pin	1
8510	9 Pin	Grappler 9 Pin	
Citizen			
120-D, 180-D	9 Pin	Grappler 9 Pin	4
124, 224	24 Pin	Grappler LX	7
GSX-140	24 Pin	Grappler LX	
GSX-200	9 Pin	Grappler 9 Pin	
MSP-10, 15E	9 Pin	Grappler 9 Pin	1
MSP-50	9 Pin	Grappler 9 Pin	1
Data Products			
9030, 9040	9 Pin	Grappler 9 Pin	1
9034, 9044	24 Pin	Grappler LX	6
DCS/Fortis			
DM-2215, 1310	9 Pin	Grappler 9 Pin	1
Diconix			
150	12 Pin	None	
300W	9 Pin	Grappler 9 Pin	1
Epson			
EX Series	9 Pin	Grappler 9 Pin	1
FX-80, 80+, 85	9 Pin	Grappler 9 Pin	1
FX-86E,FX-185	9 Pin	Grappler 9 Pin	3,11
FX-100,FX100+	9 Pin	Grappler 9 Pin	1
FX-286	9 Pin	Grappler 9 Pin	3,11
FX-286E	9 Pin	Grappler 9 Pin	3,11
JX Series	9 Pin	Grappler 9 Pin	1
GQ3500	Laser	Grappler LX/LS	9
LQ500	24 Pin	Grappler LX	
LQ800, LQ850	24 Pin	Grappler LX	
LQ1000, LQ1050	24 Pin	Grappler LX	
LQ2400, LQ2500	24 Pin	Grappler LX	
LX800, MX 80	9 Pin	Grappler 9 Pin	11
DFX-5000	9 Pin	Grappler 9 Pin	13
DFX-8000	9 Pin	Grappler 9 Pin	13
ELP7000	Laser	GrapplerLX/LS	
Facit			
4509	9 Pin	Grappler 9 Pin	3,11
4510, 4511	9 Pin	Grappler 9 Pin	1
4513, 4514	9 Pin	Grappler 9 Pin	1
B1100, B3100	9 Pin	Grappler 9 Pin	1
B3150	9 Pin	Grappler 9 Pin	1
B3450	24 Pin	Grappler LX	6
C5500	9 Pin	Grappler 9 Pin	1
C6510,C6520	9 Pin	Grappler 9 Pin	1
C7400,C7500	9 Pin	Grappler 9 Pin	1
P7080A	Laser	Grappler LX/LS	9

Printer	Type	Grappler	Notes
Fujitsu			
DL2400	24 Pin	Grappler LX/LS	6
DL2600	24 Pin	None	
DL3000 Series	24 Pin	None	
DL4400	24 Pin	Grappler LX	6
DL5600	24 Pin	None	
DX2100, 2200	9 Pin	Grappler 9 Pin	1
DX2300, 2400	9 Pin	Grappler 9 Pin	1
RX7300	Laser	Grappler LX/LS	9
Genicom			
1025	9 Pin	Grappler 9 Pin	1
5010	Laser	Grappler LX/LS	9
Hewlett Packard			
DeskJet,	Inkjet	Grappler LX/LS	9
DeskJet Plus	Inkjet	Grappler LX/LS	9
LaserJet	Laser	None	
LaserJet II, IIP,IID	Laser	Grappler LX/LS	
LaserJet III	Laser	Grappler LX/LS	
PaintJet	Inkjet	None	
ThinkJet	Inkjet	None	
IBM			
ProPrinter	9 Pin	Grappler 9 Pin	
QuietWriter		None	
Kyocera			
F-1000A, F-1010	Laser	Grappler LX/LS	9
F-2010, F-3010	Laser	Grappler LX/LS	9
Laser Computer			
190E,190A	9 Pin	Grappler 9 Pin	1
Mannesman Tally			
MT85, M86	9 Pin	Grappler 9 Pin	1
MT87, M88	9 Pin	Grappler 9 Pin	1
MT165	9 Pin	None	
MT290, M460	9 Pin	Grappler 9 Pin	1
MT330	24 Pin	Grappler LX	6
MT910	Laser	Grappler LX/LS	9
MT-SP80	9 Pin	Grappler 9 Pin	
Nissho			
NP2410	24 Pin	Grappler LX	6
NEC			
LC860	Laser	Grappler LX	9
P5XL, P6, P7	24 Pin	Grappler LX	6
P9XL, P2200	24 Pin	Grappler LX	6
P5200, P5300	24 Pin	Grappler LX	6
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Okidata			
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2410 Series	9 Pin	None	
KXP-1080 Series	9 Pin	Grappler 9 Pin	
KXP-1090 Series	9 Pin	Grappler 9 Pin	
LaserLine 6	Laser	None	
ML-180	9 Pin	None	
ML-192,192+	9 Pin	Grappler 9 Pin	
ML-193+	9 Pin	Grappler 9 Pin	
ML-292, 293	9 Pin	Grappler 9 Pin	
ML-393+	24 Pin	Grappler LX	6
400 & 800	Laser	Grappler LX/LS	
240	24 Pin	Grappler LX	
Olivetti Office USA			
DM 1005	9 Pin	Grappler 9 Pin	1
Olympia			
LaserStar6	Laser	Grappler LX/LS	9
NP30	9 Pin	None	1
NP80S	9 Pin	Grappler 9 Pin	1
NP136S	9 Pin	Grappler 9 Pin	1
PCPI			
Lsrimg 1000	Laser	Grappler LX/LS	9
2000, 3000	Laser	Grappler LX/LS	9
Panasonic			
1080i, 1091i	9 Pin	Grappler 9 Pin	3,11
1081, 1061i	9 Pin	Grappler 9 Pin	
1090	9 Pin	Grappler 9 Pin	4,11
1092i	9 Pin	Grappler 9 Pin	1
1124, 1524	24 Pin	Grappler LX	6,11,13
1592, 1595, 1695	9 Pin	Grappler 9 Pin	1
4420	Laser	Grappler LX/LS	9
4450, 4455	Laser	Grappler LX/LS	9

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Printek			
930/dlx	9 Pin	Grappler 9 Pin	1
2000TX,2000CX	9 Pin	Grappler 9 Pin	1
Ricoh			
PC6000	Laser	Grappler LX/LS	
Seikosha			
BP-5420	9 Pin	Grappler 9 Pin	1
MP-1300AI	9 Pin	None	
SK 3000AI	9 Pin	Grappler 9 Pin	1
SK 3005AI	9 Pin	Grappler 9 Pin	1
SK 3500+	9 Pin	Grappler 9 Pin	1
SL-80AI, 130AI	24 Pin	Grappler LX	6
SP 180, 185AI	9 Pin	Grappler 9 Pin	1
SP1200	9 Pin	Grappler 9 Pin	1
SP 2000+	9 Pin	Grappler 9 Pin	1
SP 1000AP	9 Pin	Grappler 9 Pin	1
Sharp			
JX-720		None	
JX-9300	Laser	Grappler LX/LS	9
Star Micronics			
Gemini 10X	9 Pin	Grappler 9 Pin	
NB-15	24 Pin	Grappler LX	6
NB25-10	24 Pin	Grappler LX	6
NB24-10, 24-15	24 Pin	Grappler LX	6
NP-10	9 Pin	Grappler 9 Pin	
NX-15	9 Pin	Grappler 9 Pin	
NX-10, 100	9 Pin	Grappler 9 Pin	1
NX-1000, 1020	9 Pin	Grappler 9 Pin	1
NX2400	24 Pin	Grappler LX	6
SD10	9 Pin	Grappler 9 Pin	
SG & SR	9 Pin	Grappler 9 Pin	
Toshiba			
P321	24 Pin	Grappler LX	12,13
P321SL	24 Pin	Grappler LX	13
P351C, P351SX	24 Pin	Grappler LX	13
PgLsr 12	Laser	Grappler LX/LS	9

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Key to Notes:
1. Epson EX, FX, JX series emulation
2. Epson LX series emulation
3. Epson RX series emulation
4. Epson MX series emulation
5. IBM ProPrinter emulation
6. Epson LQ series emulation
7. Plug in cards emulate LQ-1000.
8. Toshiba P351 emulation
9. HP LaserJet Plus emulation
10. HP compatibility option required
11. No reverse line feed
12. Parallel extension needed
13. Slow printing / not recommended

NOTICE:
This chart represents the best current information, based on testing and data supplied by the printer manufacturers. Printers listed as compatible may still exhibit variations in multiple page alignment, slower print speeds and other minor limitations. Laser printers require a minimum of 1MB of printer RAM.

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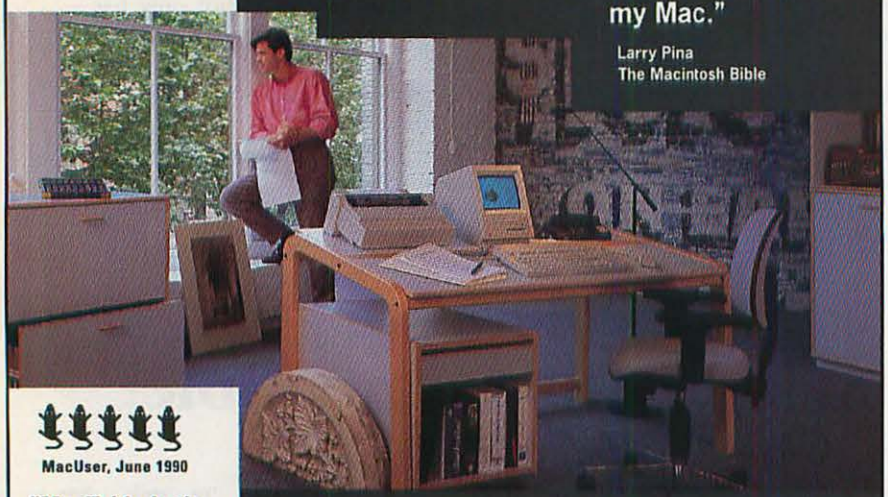
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MacUser, June 1990

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Think backup. And once you switch, think backup again.

You need Retrospect, a backup program that won an Eddy under System 6 and carries on the tradition into System 7. Retrospect is as familiar with Aliases and the Extensions folder as it is with tape drives and SyQuest cartridges. And to backup networked Macintoshes to one storage device, there's Retrospect Remote.

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attention to the crucial area of engineering-analysis and engineering-development tools.

Third, the performance of the Macintosh has been insufficient to support the quality graphics and rendering that engineers and designers demand. One can even argue that mainstream applications such as Photoshop and FreeHand are insufficiently supported by the Mac in terms of performance. How does Apple

The performance of the Macintosh has been insufficient to support the quality graphics and rendering that engineers and designers demand

respond? By dismissing the engineering group that was constructing advanced graphics hardware for Apple computers.

Fourth, Claris CAD, from Apple's software subsidiary, became the largest-selling CAD package on the Mac. And third-party developers rightly asked why they should go through hoops to support a competitor.

There are several more reasons, but I don't need to go on. Once every two years or so I write a column on the topic of Apple's lack of performance in CAD—and the past two times I have had celeric responses from the company's PR group about the amount of resources that Apple dedicates to this market. The truth of the matter is that Apple has succeeded in neglecting one of the most important markets for personal computing in the world—and continues to do so even today. So while the corporate thinkers are strategizing about a way to enter the consumer electronics market, Apple continues to demonstrate a failure to implement its own best strategy.

That's the real pity. The Mac would have made a marvelous tool for a Renaissance man. ■

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SCSI SPEED EVALUATOR TESTS, *MACWORLD* 1991

	Read	Write	R/W Total
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FWB HammerDisk 600S	3063	1858	4921
SuperMac LaserFrame	2454	1781	4235
Storage Dimensions E01000	3000	1061	4061
MicroNet SB-SMO-1	2426	1127	3553
PLI Infinity Optical	1684	1866	3550

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FWB HammerDisk 600S	5495	1201
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Storage Dimensions E01000	6695	2401

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A Mac's Best Friend

With the introduction of BeagleWorks, the true meaning of integrated software has finally been defined. BeagleWorks includes seven modules so fully integrated you can easily access the **Word Processor, Database, Spreadsheet, Chart, Paint, Draw and Communications modules** from anywhere in the program.

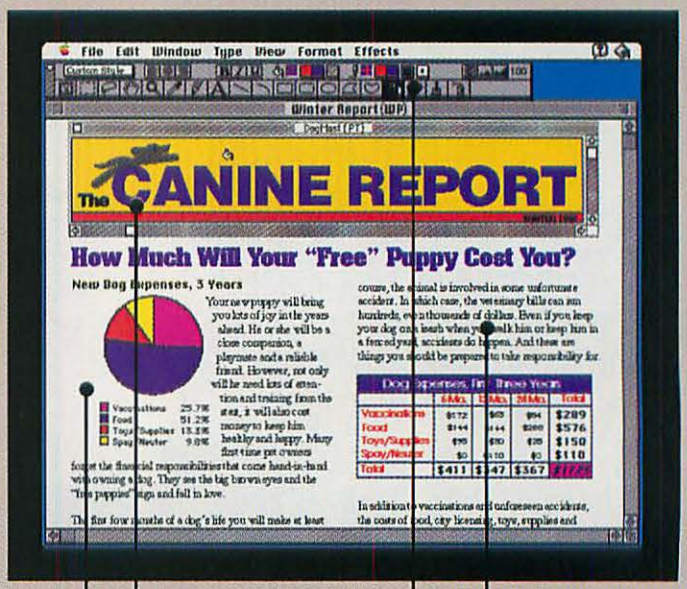
The word processor features irregular text wrap, multiple columns anywhere on a page and the Microlytics® 110,000 word Spelling Checker and 660,000 word Thesaurus. The Paint and Draw modules let you use up to 256 colors. The Spreadsheet boasts an automatic sum tool, as well as in-cell editing.

BeagleWorks has these and many other powerful features commonly found in stand-alone programs. It's easy for the novice to use, yet you won't outgrow its capabilities. Since it requires only 1 megabyte of RAM to run, BeagleWorks is an excellent solution for any Macintosh user.

Beagle Makes Its Mark



Exclusive to BeagleWorks is a revolutionary technology called **In-Context Editing**™. This gives you the ability to access one file from within another by simply double-clicking. For example, if you have placed a graphic from a paint file into a word processor document and decide to make a change, all you need to do is double-click on the graphic in the word processor. The Paint tools are added to the tool bar, the graphic becomes active and any changes you make are also made to the original file.



- **In-Context Editing™**- Allows editing of one file from within another by simply double-clicking.
- **Automatic Irregular Text Wrap**- Text takes on shape of the graphic.
- **Multiple Columns**- Can be turned on or off anywhere on the page.
- **Common Tool Bar**- Frequently used tools are easily accessible.

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Integrated Software: Who Leads The Pack?	BeagleWorks™	ClarisWorks™	GreatWorks™	Microsoft Works®
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In-Context Editing™ (multiple documents)	YES	NO	NO	NO
Paint module	256 Colors	NO	Black&White	NO
Common tool bar w/module-specific tools	YES	NO	NO	NO
Automatic irregular text wrap	YES	NO	NO	NO
Multiple columns can be turned on/off anywhere on the page	YES	NO	NO	NO



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—Chris Shipley, PC Computing

Hardware Requirements: Apple Macintosh® 512KE or higher, 800K drive—and a Hayes® compatible modem.

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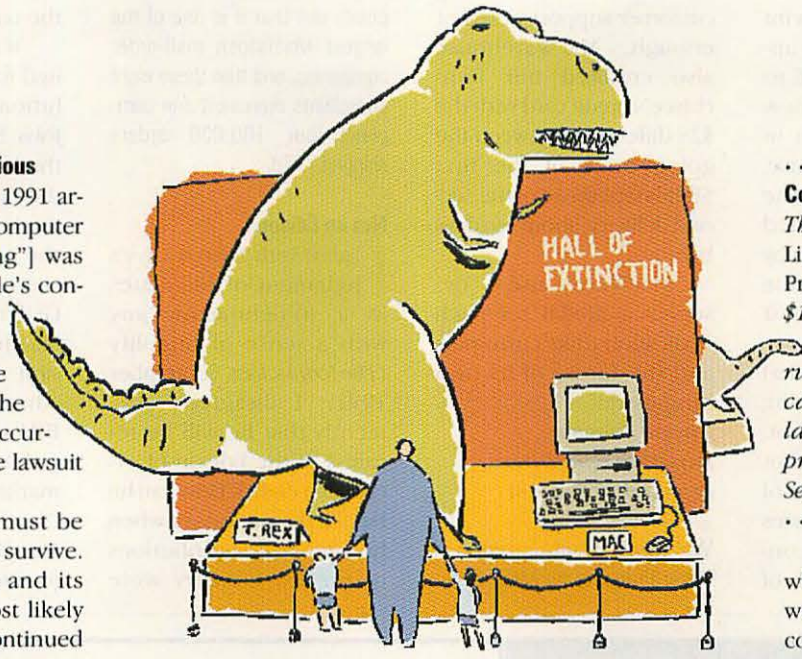
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LETTERS



WARD SCHUMAKER

Survival of the Litigious

Your September 1991 article on Apple Computer ["That Vision Thing"] was praiseworthy. Apple's continued innovation should spearhead it into a profitable future. However, the chances for that occurring depend on the lawsuit with Microsoft.

Windows 3.0 must be killed for Apple to survive. Otherwise, Apple and its Macintosh will most likely decline. Apple's continued inefficiency in management systems upgrading, and in pricing, presages a fate akin to that of other pioneers of personal computing such as Adam Osborne, VisiCalc, and the Electric Pencil. Like a dinosaur once in its heyday, Apple must give way to the times.

Marvin Gozum
Philadelphia, Pennsylvania

A Writer's Needs

Robert Eckhardt's appraisal of word processing programs in the September issue ["Write—or Wrong?"] took an interesting and useful tack: that of delineating the tasks and then determining which word processor best accomplished the jobs described. But there is one task that did not get addressed in his article, a task that is rarely given much explicit attention in such reviews, or for that matter, in the software itself. That task is writing.

Writing is the creative interplay of language and ideas. This definition is not new or radical. What is relatively new and radical are the careless assumptions that formatting is writing and that word processing programs are writing programs. These assumptions simply are not true. What we need are word processing programs that actually respond to the needs of a writer writing.

Ralph Schneider
Eleva, Wisconsin

Word Processor Aficionado

The manager of a local computer store, a PC devotee, derisively asked me why anyone would need more than one word processor. If I had to learn a completely new interface and set of commands every time I switched programs, instead of variations on the Mac's standard interface, I might be as negative as he, and just as bound by only one set of features for all my different writing needs.

Rory Waite
Saskatoon, Saskatchewan, Canada

Nisus Is Nicest

As a devoted fan of Nisus, I was disappointed to find that "Write—or Wrong?" did not indicate Nisus as a "Top Pick" in any of the seven categories discussed.

Nisus has a number of features that, though not specifically necessary for the types of writing discussed, clearly set it apart as superior for writers in many fields: hypertext capability, GREP find-and-replace functions, an extensive built-in macro programming language, and unlimited undos, just to name a few.

Corrections

The correct price for The Little System 7 Book *(*New Products, *October 1991) is $12.95.*

De Anza Boulevard runs by Apple's Cupertino campus and was mislabeled as Lawrence Expressway ("Inside Apple," September 1991).

I suggest that readers who are shopping for a word processor carefully consider all the features of each product as they apply to their individual needs, rather than relying on a list.

Joseph Kissell
Dallas, Texas

Don't Bash Bill

Why is everyone in the Macintosh community suddenly turning to Bill-bashing [*The Iconoclast,* September 1991]? Mr. Gates is to be admired and congratulated. He paired his technical skills and business savvy with good old-fashioned hard work and built a billion-dollar business. His brains, ingenuity, and foresight directly created over 7000 jobs, richly rewarded investors, drives an entire industry, stimulates future entrepreneurs to compete, and pumps untold billions of dollars of revenue into the U.S. economy and treasury.

Matthew Snider
North Richland Hills, Texas

(continues)

Medal for MacWarehouse

This is an amazing but true story about customer service we have received recently from MacWarehouse of Norwalk, Connecticut.

One of our quick-print franchisees wanted to upgrade his Macintosh SE to 2.5MB and buy some new software. We put him in touch with MacWarehouse, who promptly sent the items that had been ordered for a total of about $300 by Federal Express. The same goods here cost almost twice as much.

Together we installed the new RAM, following MacWarehouse's excellent, idiot-proof instructions, but the SE would have none of it. A couple of helpful faxes later, MacWarehouse concluded that one or both of the 1MB SIMMs were defective. Within two days, entirely at their expense, MacWarehouse sent two new SIMMs, which work perfectly.

As if such outstanding customer support were not enough, MacWarehouse also credited our franchisee's credit card with the $28 difference between the going price of the first SIMMs and those of the second delivery, about ten days later.

MacWarehouse deserves a medal for such dedication to its customers and the future of its own business.

Guy AB Knapton
Joint Managing Director
Prontaprint Belgium

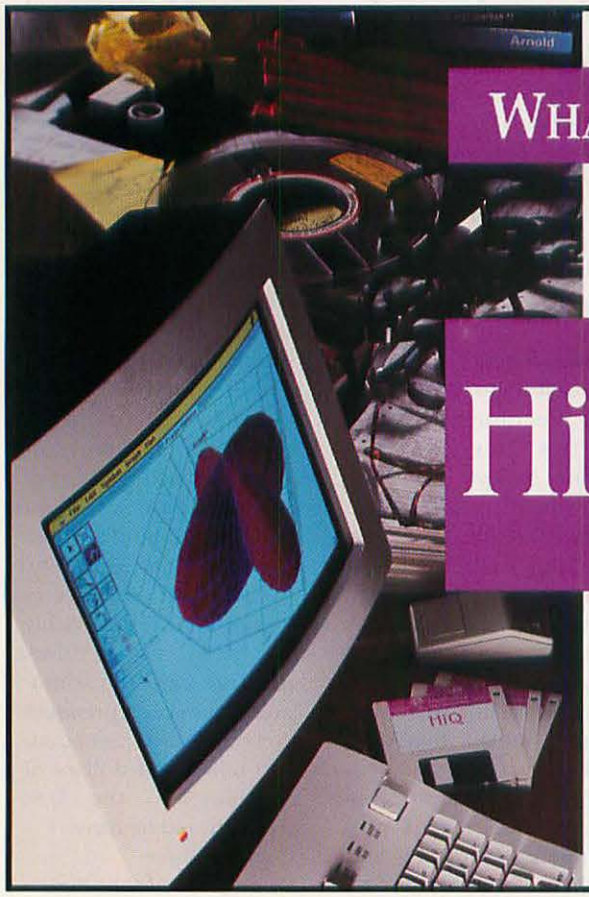
We'd like to clarify a caption in "Mac Products by Mail" (*Conspicuous Consumer,* November 1991) by explaining that MacWarehouse responded promptly to each of the eight complaints it received from us, resolving the problem with the customer in each case. MacWarehouse points out that it is one of the largest Macintosh mail-order companies, and that these eight complaints represent one complaint per 100,000 orders shipped.—Ed.

Not an Edison

I agree with Steven Levy's judgment of Bill Gates as a straight-arrow guy with a sense of humility (*The Iconoclast,* September 1991). I disagree vehemently that he will be recalled as the Edison of everything digital. How can he be called an innovator when his only real contributions to the PC industry were BASIC and Excel? Everything else was either bought from others or a technologically inferior emulation. The only accomplishment he can call his own is his uncanny ability to undercut the competition.

If anyone is to be credited for the PC/digital revolution, it should be Steve Jobs. Steve Jobs at least had the following to his credit: the first successfully mass-marketed microcomputer, the Apple II, and the first successfully mass-marketed GUI microcomputer, the Macintosh. This is real vision, not the one Bill Gates advocates, which is closer to IBM's sense of control, control, and more control of the market.

Chia-teh Wu
New York, New York
(continues)



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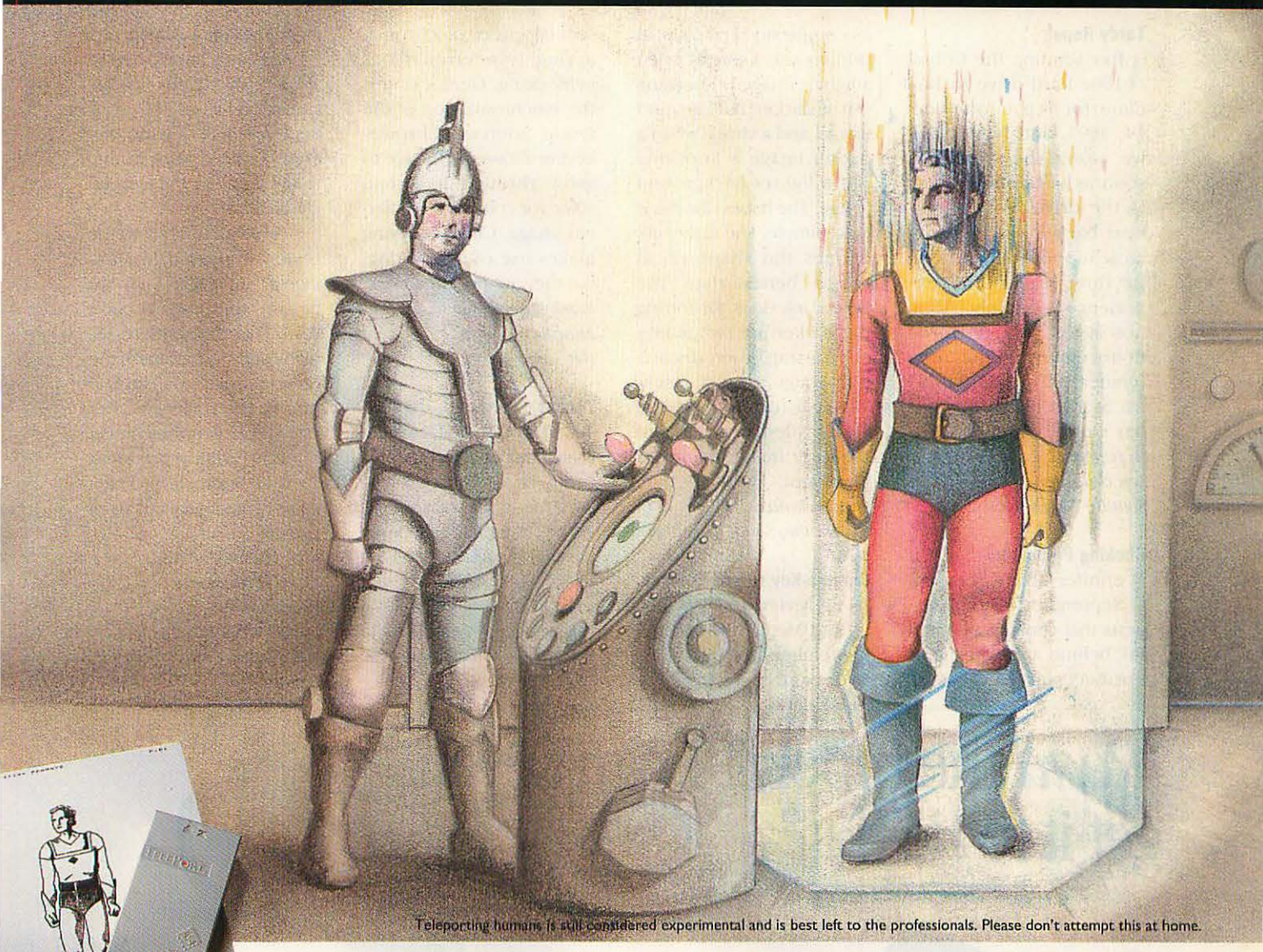
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Tardy Repair

After sending the Cobra 100e hard drive to Rodime for repair on June 14, 1991, and being told we would be called as soon as someone looked at the drive, we did not hear back from the technical-support department for three weeks. This experience certainly does not agree with the pronouncement in the September 1991 issue ["Budget Storage"] that Rodime has a one-day turnaround in repairs.

Lea Galanter
Seattle, Washington

Choking Pinpointed

Jennifer Ball [*Letters*, September 1991] suggests that choking a lighter ink behind a darker ink is not necessary because of its complexity. Professional printers use a spread when a lighter image is knocking out a darker background image, and a choke when a darker image is knocking out a lighter background image. The reason for this is quite simple. The darker ink defines the shape of an image better than the lighter ink does. Distorting the darker ink (when creating a trap) then distorts the image quality itself. Thus, distorting the lighter ink is less noticeable to the eye. Image quality is important.

Ken Dickman
Greenville, South Carolina

Chroma-Key versus Genlock

The review of DVA-4000 and Mediator [*Reviews*, September 1991] contains an error in terminology. The special effect of chroma-keying is referred to as genlocking. Genlocking is the synchronization of different sources. Chroma-keying allows one image to show through a certain color (or colors) of a different image. Chroma-keying makes use of genlocking, but they are not the same.

Mark Foreman
Atlanta, Georgia
via CompuServe

We stand corrected. The DVA-4000/Macintosh video-input board provides a sophisticated chroma-keying function that allows you to set transparency values for up to 256 indexed screen colors. As it turns out, the DVA-4000 and Mediator output box also provide genlocking capabilities, allowing you to synchronize two external video sources.—Ed.

Paint Package Updated

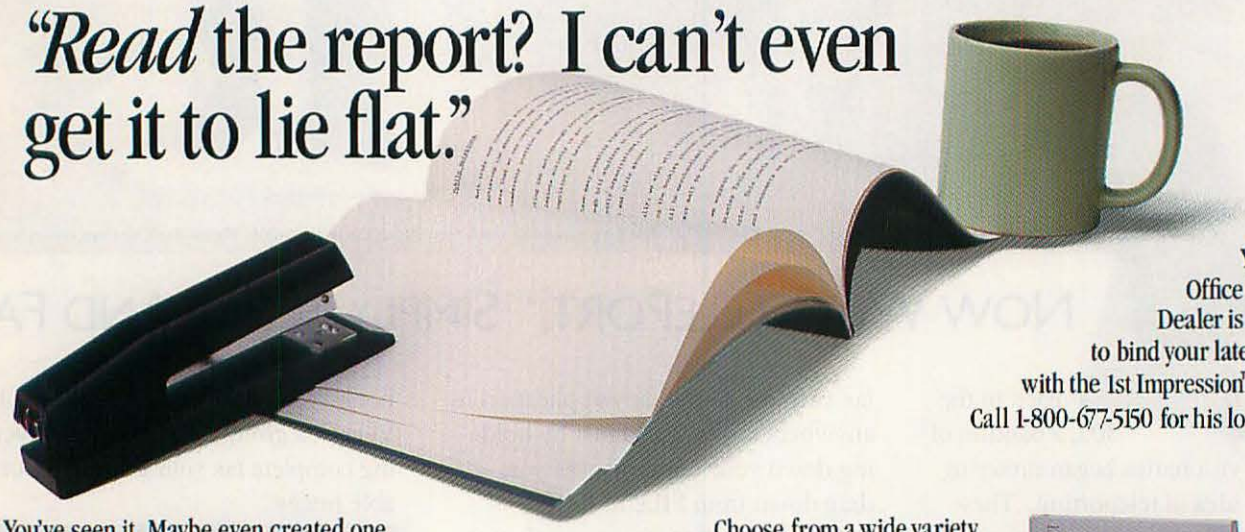
While we were pleased to see PixelPaint Professional 2.0 reviewed in your September 1991 issue [*Reviews*], there were points that we felt deserved clarification.

A full month before the review appeared in *Macworld*, SuperMac Software began shipping version 2.0.1. This release addresses many of the criticisms in the review. Also, at several points the reviewer criticizes Pro 2.0 in the context of photo-editing products, such as Photoshop. PixelPaint Professional is a paint package.

Rick Lucas
PixelPaint Product Champion
SuperMac Software
Sunnyvale, California

(continues)

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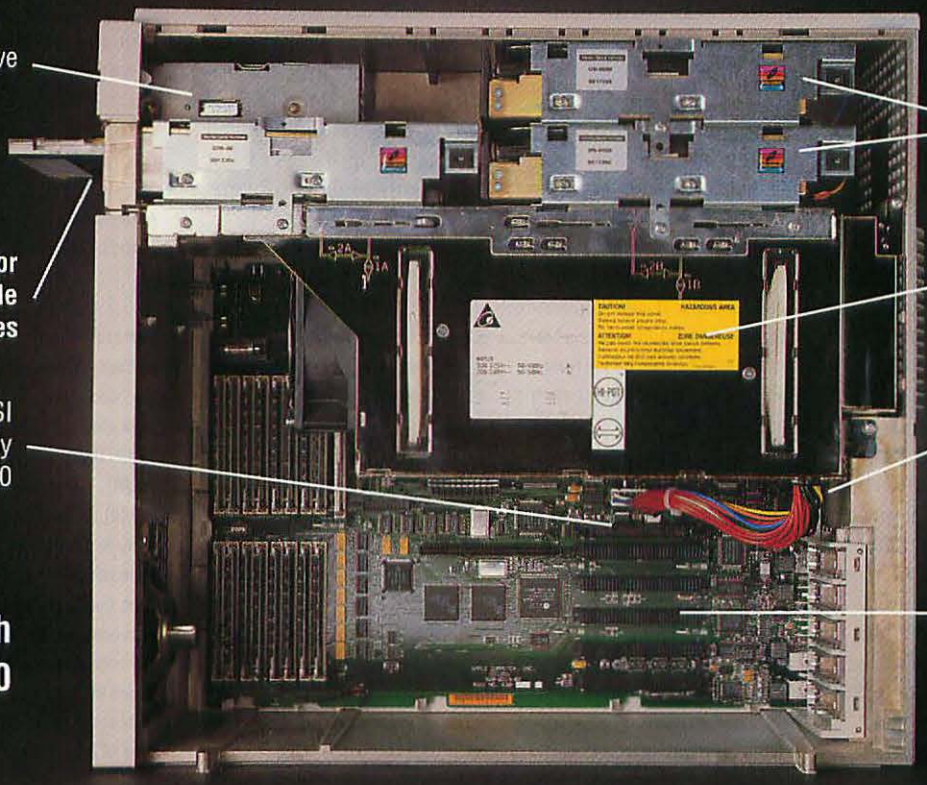


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Although version 2.0.1 was released before the review ran, we did not receive it until after the September issue had gone to press.—Ed.

Piracy Sting?

The August and September 1991 issues of *Macworld* carried a Microsoft ad offering a free mouse pad if any of your readers has an unregistered copy of Microsoft Word. This offer smells of a sting operation. This is the same kind of game our local police have used to get persons with outstanding parking and moving violations to come in and get a free trip to somewhere. When they did, they were arrested. What person, who has stolen a copy of Word, would tell Microsoft that they have it? What is going on, exactly?

Thank God, I don't use any Microsoft software, stolen or otherwise.

Sam J. Kopetzky II
Los Angeles, California

Microsoft responds that fewer than half of Mac users ever complete the registration cards. Owners of Word are entitled to subscriptions to newsletters, technical support, and replacement of damaged disks. Microsoft is opposed to software piracy but wasn't running a sting operation.—Ed.

System 7 Enthusiast

I was surprised to read the complaints from Macintosh users about System 7 [*Letters,* October 1991]. I had always believed that anyone who used a Mac was just slightly more flexible and creative in their thinking than those who beat their heads against MS-DOS machines. System 7 is a must for anyone who wants to continue to advance with a Mac. All of those who don't might well buy a PC and discover what real compatibility problems are under Windows.

Wayne Burdick
Santa Clara, California

Cool E.L.F. Armor

I am writing to address a legitimate concern that you and others have had ["Seeking ELF Relief," October 1991] that the use of an E.L.F. Armor unit monitor might cause overheating and thereby damage the monitor.

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George Reid
President
Fairfield Engineering
Fairfield, Iowa

Letters should be mailed to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1). Include a return address and a daytime telephone number. We regret that, due to the high volume of mail received, we are unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*

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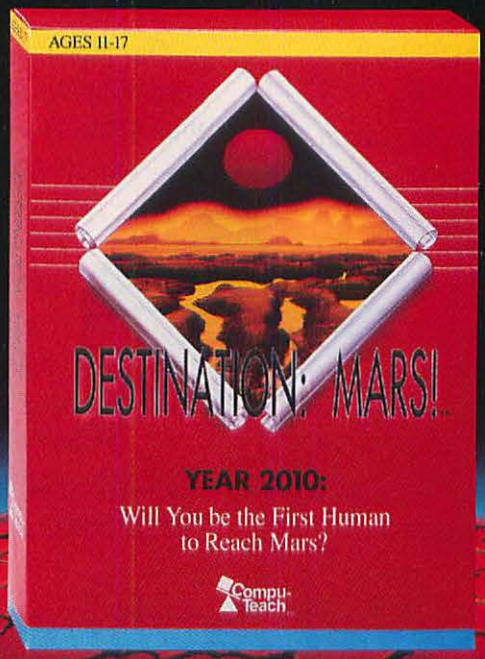
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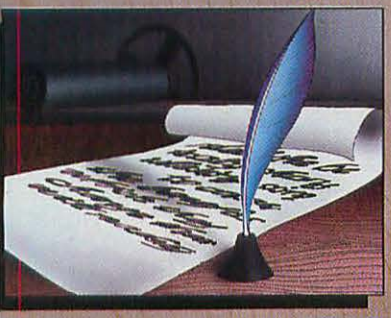
Circle 168 on reader service card.

The Evolution of CAD

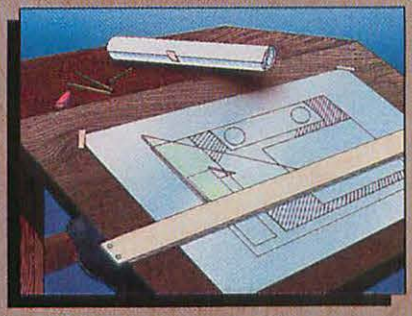
From the beginning of time, man has tried to express himself through graphics.



In the beginning man had to use primitive tools for creating graphic designs.



In the 15th Century design tools were quill ink pens and crude styles of paper.



By the 18th Century man had advanced to the drafting table with the T-squares, slide rules, precision ink pens and the dreaded eraser.



In the 20th Century the first CAD programs were very slow and extremely difficult to use, not to mention the expense of buying them.



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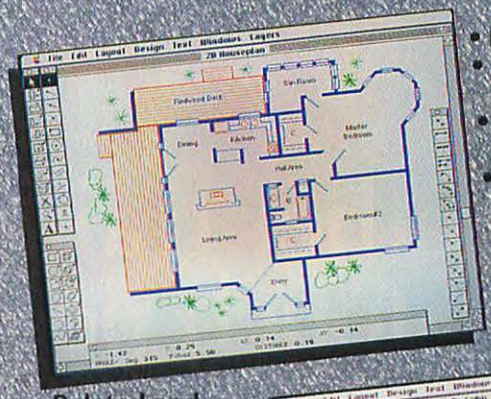
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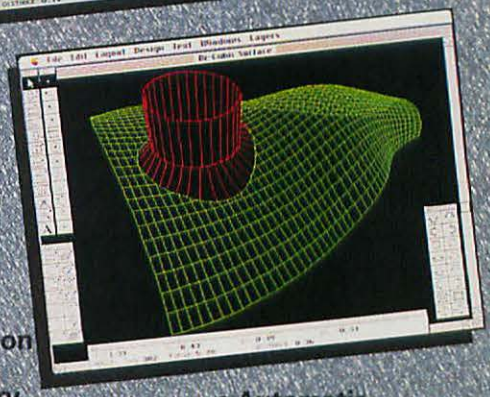
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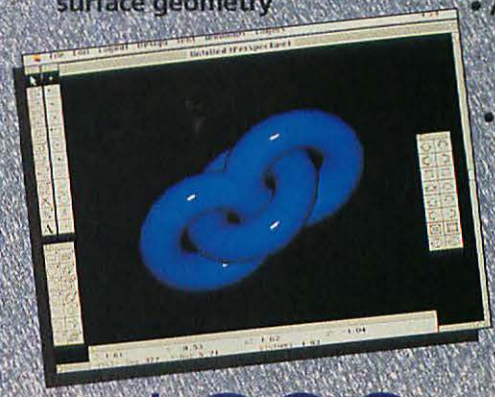
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ART BEAT

by Cathy Abes

The tools and the talent behind Macworld's graphics and the techniques that make them possible



The final illustration that appears on page 154 of our Christmas feature.

Artist: Los Angeles–based illustrator and animator David Peters specializes in collage illustrations. His work spans magazines (including *California Magazine* and *Los Angeles Times Magazine*), album covers, film, and video.

Tools: Mac IIfx with 8MB of RAM; 170MB hard drive; SyQuest 44MB removable-cartridge drive; 19-inch SuperMac RGB monitor with PDQ 24-bit accelerator board; Microtek MSF-300ZS color scanner; Adobe Photoshop 2.0.

How It Was Done: For the illustration on page 154 of our Christmas-gift feature, Peters combined images he'd photographed with magazine photos and other images he created himself. Before scanning the photos, he cut them out, ganged them on white paper, and scanned them in as one image—to minimize megabytes and to keep the elements organized. The white background allowed for cleaner cut-and-paste when the elements were placed in the illustration.

To build the background level in Photoshop, Peters first drew the checkered floor grid using the line tool and filled in the tiles with the paint bucket. He used the line tool and the gradient-fill tool to create the background walls. He then saved everything up to this point as the background file.

Peters squeezed and scaled the images of the monitor and CPU to make them look taller and then skewed them slightly in one direction to give them the appearance of being pushed. Then he attached the image of the man (previously created in a separate file) to the monitor.

After joining the printer and stand as one element, Peters used the Distort command (Image menu) to make it look askew. He then positioned the trackball-mouse, the other trackballs, the snow domes, and the Christmas packages.

Peters created the shadows under the printer stand and CPU by using the lasso tool and the option key together. With the area selected, he chose the gradient-fill tool and the eyedropper to select the darkest color in or near the area being worked on. After setting the gradient fill's opacity to 25 percent, he dragged the tool to create the light-to-dark effect.

Selecting the shadow areas for the trackballs with the elliptical marquee, he used the same gradient-fill process as before.

For the type on the monitor screen, Peters used the type tool to approximate the correct font (in yellow) and saved it in a separate file. Then, using the rectangular marquee, he created a box around the type, approximating the size of the monitor screen. Using the paint bucket, he selected a color that matched the screen on the original monitor. He brought this box into the working illustration and positioned it over the monitor using skew and distort. Then he joined the box to the monitor. To simulate the border lines found on a dialog box, he used the line tool.

Because the character in the foreground needed to look aghast (the original image had a happy, grinning face), Peters resorted to major digital surgery. Using scale and distort, he pulled the face up and out at the top to give it a shocked look. Then using the lasso, he selected the lower teeth and chin and moved them down to open the mouth. Next, he rotated them to give an expressive angle to the mouth, to drop the jawline, and to turn the grin into a grimace. To re-create the interior of the mouth, Peters first reconnected the shadow lines and cheek using the rubber-stamp tool and then the smudge tool. Then he used the rubber-stamp tool to fill in the dark areas. With the pencil, he replaced the teeth that had been lost through the previous alterations and added some new ones. He used the smudge tool to blend the teeth and mouth and give them a uniform and natural look.

The suit jacket also required some work. Since the original image had only a left shoulder (the right one was obscured), Peters used the lasso to select the left shoulder, then flipped it, positioned it, and pasted it down to become the

(continues)

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The original scanned-in head.



The mouth and chin were cut out and dragged to drop the jawline.



The altered face, ready for placement.



The original scanned-in suit.



The artist constructed the right shoulder by duplicating and flopping the left one and rebuilding the pocket, handkerchief, and lapel.



The shocking results of the artist's digital surgery.

right shoulder. The lapel and the handkerchief in the breast pocket were created with the rubber-stamp tool.

After saving the suit, Peters selected the head and positioned it over the suit. He used the scale tool to stretch the suit so it would better fit the head, which he'd intentionally oversized. A portion of the neck still covered the shirt collar and tie, so he used the magic eraser to remove the excess. Then using the rubber-stamp tool, he sculpted the right side of the neck to make it fit the collar. After saving the head and suit as one element (still in a separate file), he selected the element and pasted it into his working illustration. Again using the scale tool, Peters pulled the element up until it was correctly positioned in relation to the background and other elements.

Peters then made some minor adjustments, including lightening the frames and interior of the glasses so the eye would show through, and blending elements into one another with the rubber-stamp tool and smudge tool. M

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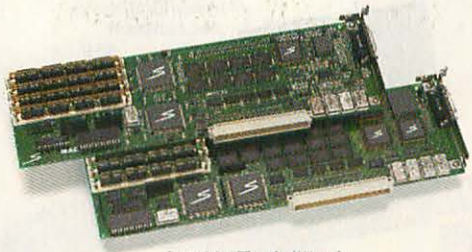
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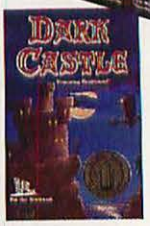
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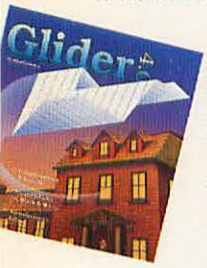
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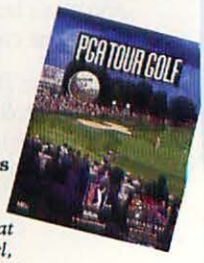
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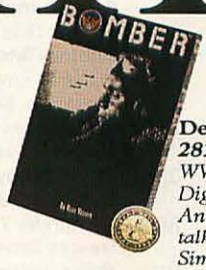
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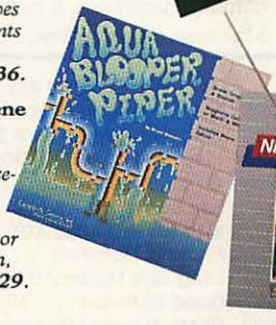






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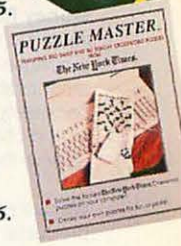
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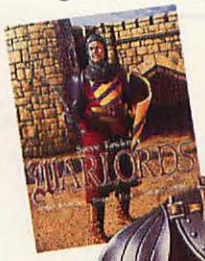


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1125 ❼MacProject II 2.5V1. . . . . 359.



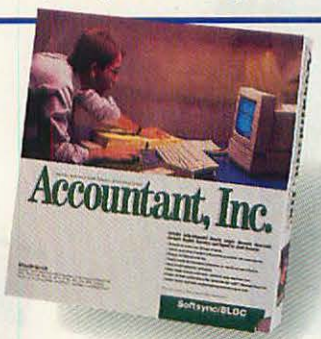
Dow Jones ... 30 day MBG
5295 *News/Retrieval Membership Package*–Allows you to retrieve information from DJN/R's 60+ databases. Contains up-to-the-second news, extensive financial data, & more. Includes 5 free hours of connect time. . . . . $24.

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5295 News/Retrieval Membership Pkg. . . 24.
1942 ❼Market Analyzer Plus 2.0. . . . . 225.
★ElseWare Corp. ... 30 day MBG
1506 ❼DataShaper 1.2. . . . . 135.
Fox Software
5572 ❼FoxBASE+/Mac 2.01 . . . . . 289.
★Franklin Software ... 30 day MBG
7070 Language Master 2.0. . . . . 45.
★Good Software ... 30 day MBG
2527 REM's Property Manager . . . . . 339.
Informix
4955 ❼Wingz 1.1A. . . . . 245.
★Inman ... 30 day MBG
3557 ❼Business Plan Toolkit 4.0. . . . . 95.
3555 ❼Business Sense 1.4.1 . . . . . 125.
★Intuit ... 30 day MBG
2507 ❼Quicken 3.0 . . . . . 42.
★Kaetron Software ... 30 day MBG
8941 ❼TopDown 3.0. . . . . 199.
Lotus Development
3606 1-2-3 for the Mac . . . . . 329.
3604 1-2-3 Competive Upgrade. . . . . 119.
★Mainstay ... 30 day MBG
7718 ❼MacFlow 3.54 . . . . . 188.



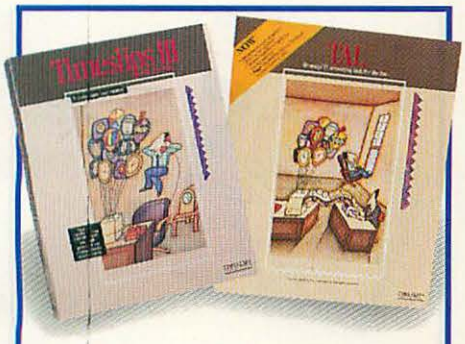
Chipsoft ... 30 day MBG
8059 *MacInTax Personal Edition 1991*–America's best selling tax software for the Mac. *MacUser's* Editors' Choice Award (2/89), & winner of the 1990 Macworld World Class Award . . . . $59.
MacInTax Personal States 1991 . . . . . ea. 42.

★MECA ... 60 day MBG
2796 ❼Managing Your Money 4.0 . . . . . 99.
★Microlytics ... 60 day MBG
9729 Strunk & White's Elements of Style. . 34.
★Microsoft ... 30 day MBG
2884 ❼Works 2.00E . . . . . 159.
4969 ❼Word 4.0D . . . . . 245.
9803 ❼Excel 3.0. . . . . 309.
2565 ❼Project 1.1 . . . . . 449.
5454 ❼The Microsoft Office 1.5. . . . . 479.
★New Era ... 30 day MBG
3130 ❼NuBASE 1.3 . . . . . 179.
★Niles & Associates ... 30 day MBG
5048 ❼EndLink 1.1.3. . . . . 58.
4602 ❼EndNote 1.4 . . . . . 85.
8010 ❼EndNote Plus 1.1 . . . . . 145.
★Nolo Press ... 30 day MBG
4228 ❼For the Record 2.0 . . . . . 30.
2981 ❼WillMaker 4.0 *(not valid in LA.)*. . . 35.
★Odesta ... 30 day MBG
5621 ❼Double Helix III 3.5 . . . . . 429.
Paragon Concepts
5683 ❼Nisus 3.06. . . . . 245.
★Portfolio Systems ... 30 day MBG
7992 ❼DynoPage or 6916 ❼Dynodex *ea.* 72.



SoftSync/Bloc ... 30 day MBG
7129 ❼ *Accountant, Inc. 2.1.1*–Comprehensive, fully-integrated accounting software that includes General Ledger, Receivables, Payables, Inventory, Invoicing, Payroll, Check Writing & more. Now available in a MultiUser version too . . . . $339.

800/800-3333.



TIMESLIPS ... 30 day MBG

2986 ❼ *Timeslips III 2.0H*–Fast, easy, accurate time and billing for service professionals. $194.
8939 *Accounting Link 1.0*–Now links with general ledger accounting programs . . . . . 52.

★PowerUp ... 30 day MBG

7696 ●Calendar Creator 1.01 . . . . . 44.
7694 ●Address Book Plus 2.0 . . . . . 63.
7698 ●Fast Forms 2.0 . . . . . 112.

★Provue ... 60 day MBG

4582 ●Panorama II 2.0 . . . . . 245.

★Que Corp. ... 30 day MBG

7482 ●RightWriter for the Mac 3.1 . . . . . 54.

★Reality Technologies ... 30 day MBG

6929 ●WealthBuilder 1.0 . . . . . 95.

★Reference Software ... 30 day MBG

6268 ●Grammatik Mac 2.0 . . . . . 58.

Round Lake Publishing

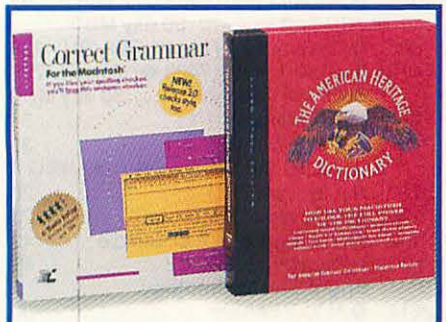
●LetterWorks, Sales or Legal . *ea.* 52.

★Shana ... 30 day MBG

7692 ●Informed Designer 1.1.1 . . . . . 159.

★Softsync/BLOC ... 30 day MBG

7129 ●Accountant, Inc. 2.1.1 . . . . . 339.



WordStar ... 30 day MBG

Award winning Correct Grammar (rated 4½ Mice by *MacUser*). The American Heritage Dictionary provides 116,000 definitions & more.
6984 ❼ *Correct Grammar 2.0* . . . . . $55.
3554 ❼ *American Heritage Dictionary* . . . . . 55.

Software Toolworks

8366 ❼Dollars & Sense 5.0 . . . . . $59.

★Spyglass ... 60 day MBG

2027 ❼Transform 2.0 or 2028 ❼Dicer 1.1 399.

★Survivor Software ... 30 day MBG

3289 ❼MacMoney 3.52 . . . . . 59.

★Symantec ... 30 day MBG

2237 ❼GreatWorks 205. 2278 Upgrade 99.
3422 ❼More 3.1 *(Oct. '91)* . . . . . 265.

★Symmetry ... 30 day MBG

3131 ❼Acta 7 . . . . . 75.

★Synergy ... 30 day MBG

6617 ❼KaleidaGraph 2.1.3 . . . . . 150.

★Teleware ... 30 day MBG

7616 ❼M.Y.O.B. 2.0 . . . . . 139.

★TIMESLIPS ... 30 day MBG

2986 ❼Timeslips III 2.0H. . . . . 194.
8939 ❼Accounting Link . . . . . 52.

★T/Maker ... 30 day MBG

3505 ❼WriteNow 2.2/Gram. & MacTools 62.
3508 ❼The PowerBundle *(w/carry case)* 159.

★Williams & Macias ... 30 day MBG

4976 ❼StickyBusiness 1.5 . . . . . 51.

★WordPerfect ... 60 day MBG

3800 ❼WordPerfect Mac 2.0.2 *(Oct. '91)* 279.

★Wordstar ... 30 day MBG

3554 ❼American Heritage Dictionary . . . 55.
6984 ❼Correct Grammar 2.0 . . . . . 55.

GRAPHICS & DESIGN

PUBLISHING, PRESENTATIONS

Adobe Systems

❼Adobe Type Library *(Vol. 1-230)* . call
6957 ❼Adobe Type Reunion 1.02 . . . . . 41.
8794 ❼Adobe Type On Call. . . . . 47.
5750 ❼Adobe Type Manager 2.02 . . . . . 59.
6053 ❼Adobe Plus Pack 2.0 . . . . . 118.
6156 ❼Adobe Plus Pack/ATM 2.0 . . . . . 174.
6098 ❼TypeAlign for ATM 1.0.4 . . . . . 62.
❼Adobe TypeSets for Business *ea.* 95.
6671 ❼Adobe Type Set 1 or 6677 ❼Set 2 62.
7587 ❼Adobe Type Set 3 . . . . . 125.
8171 ❼Adobe Illustrator 3.0.2 *(w/ATM)* . 369.
6644 ❼Adobe Photoshop 2.0 . . . . . 549.
5001 ❼Streamline 2.0 . . . . . 122.

★Aldus ... 30 day MBG

2461 ❼Aldus Gallery Effects 1.0 . . . . . 129.
6674 ❼Aldus Personal Press 1.01 . . . . . 195.
3506 ❼Aldus SuperPaint 3.0. . . . . 133.
3980 ❼Aldus Digital Darkroom 2.0 . . . . 259.
3507 ❼Aldus Super 3D 2.5. . . . . 325.
7467 ❼Aldus PrePrint 1.6 . . . . . 325.
4751 ❼Aldus Persuasion 2.0 . . . . . 325.
1330 ❼Aldus FreeHand 3.0 . . . . . 395.
7088 ❼Aldus PageMaker 4.01 . . . . . 495.
8054 ❼Aldus Design Team *(best buy)* . . 859.

Altsys

9806 ❼Metamorphosis Pro 2.01 . . . . . 89.
1195 ❼Fontographer 3.3 . . . . . 265.
1983 ❼EPS Exchange 1.0 . . . . . 89.

★Ares Software ... 30 day MBG

8878 ❼FontMonger 1.04 . . . . . 62.



Teleware ... 30 day MBG

7616 ❼ *M.Y.O.B. 2.0*–Incredible, easy-to-use, accounting software for small to medium size businesses. Features include fully integrated A/P, A/R, General Ledger, Inventory, Checkbook and Card File. . . . . $139.

★Baseline Publishing ... 30 day MBG

8055 ❼Screenshot 1.1 . . . . . 34.
7784 ❼Color MacCheese 2.0.8 . . . . . 56.

Bitstream

❼True Type Fonts 1 or 2 59. ❼3 or 4 98.

Broderbund Software

3572 ❼Kid Pix 1.2 *(Oct. '91)* . . . . . 34.
1427 ❼The Print Shop 1.3.2 . . . . . 35.
6281 ❼TypeStyler 2.0 *(w/ATM, Oct. '91)* 127.

★Casady & Greene ... 30 day MBG

8879 ❼Fluent Font Library 4.05 . . . . . 99.
1945 ❼True Type Starter Set . . . . . 57.

Claris

1123 ❼MacPaint II 2.0 . . . . . 89.
2518 ❼MacDraw Pro . . . . . 279.
8007 ❼Claris CAD 2.0 . . . . . 629.

Custom Applications

8037 ❼Freedom Press Light 3.01 *(17 fonts)* 55.



T/Maker ... 30 day MBG

3508 *The PowerBundle*–Includes a high-quality carrying case for the new Macintosh PowerBook, WriteNow 2.2, ClickArt for faxes, Address Book 2.0, America Online, Business Expense Reports, valuable coupons, and luggage tags . . . . $159.

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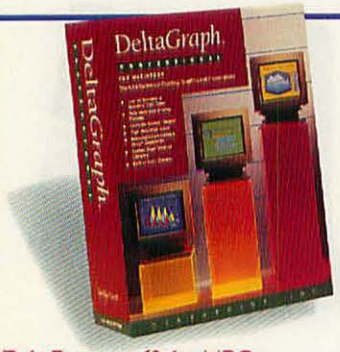
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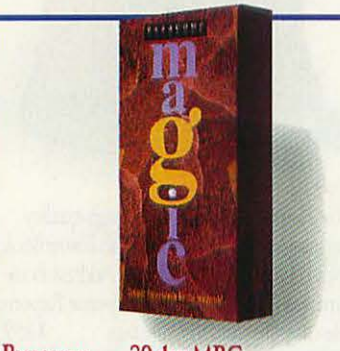
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DeltaPoint ... 60 day MBG

3558 *DeltaGraph Professional*–Over 35 different chart types for business, presentation, scientific, statistics, and engineering in both 2D and 3D. Chart types include: line, pie, bar, column, scatter and others..... $189.

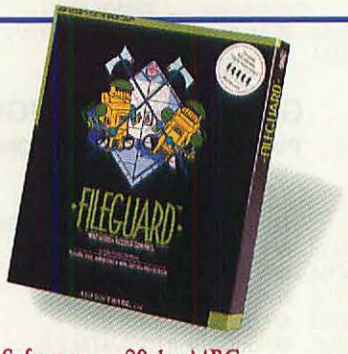
★DeltaPoint ... 60 day MBG
3558 ❼DeltaGraph Pro..... 189.
★Deneba Software ... 30 day MBG
3227 ❼Canvas 3.0..... 249.
★Foundation Publishing ... 60 day MBG
6728 ❼Comic Strip Factory 1.6..... 36.
IDD/Innovative Data Design
2417 ❼MacDraft 2.1..... 279.
★Letraset ... 30 day MBG
2619 ❼ImageStudio or 4709 ❼LetraStudio 139.
2621 ❼Ready Set Go! 4.5A..... 165.
6301 ❼ColorStudio 1.5..... 599.
★Linguist's Software ... 60 day MBG
Over 100 language fonts..... call
★Mainstay ... 30 day MBG
9798 ❼Capture 4.0..... 75.
★MicroFrontier ... 30 day MBG
3013 ❼Color It! 1.0..... 75.
★MicroMaps ... 30 day MBG
7556 ❼MapArt *(PICT)* or 7555 *(EPS)* ea. 89.
★Microsoft ... 30 day MBG
2878 ❼PowerPoint 2.01D..... 245.
★Monotype Typography ... 30 day MBG
❼Monotype Imprints-TrueType ea. 22.
Classic Fonts *(full line available)* ... call



Paracomp ... 30 day MBG

3148 ❼*Magic 1.0*–Instantly create a presentation using the templates, buttons, backgrounds, and sounds that come with Magic, or create your own graphics, text and animations with familiar draw-type tools..... $249.

Multi-Ad Services
3430 ❼In House PAL Potpourri..... $109.
8767 ❼Multi-Ad Creator 3.0..... 569.
★Paracomp ... 30 day MBG
3148 ❼Magic 1.0 *(Oct. '91)*..... 249.
5028 ❼ModelShop 2.0..... 569.
❼SwivelArt *(Map & Viewpoint art)* ea. 156.
7441 ❼Swivel 3D Professional 2.0 .... 435.
3450 ❼SwivelMan 569. 3440 ❼QuickPICS 94.
Postcraft International
2210 ❼Effects Specialist..... 95.
❼Layouts for PageMaker, ReadySetGo, & QuarkXPress..... ea. 69.
Quark
7612 ❼QuarkXPress 3.1 *(Dec. '91)*.... 519.
★Springboard ... 30 day MBG
3530 Certificate Maker 2.02..... 22.
Strata
7773 ❼Stratavision 3D 2.0..... 629.
★SuperMac Tech. ... 60 day MBG
5625 ❼PixelPaint Pro 2.0..... 459.
3G Graphics
3942 ❼Images with Impact: Graphics 1 . 49.
4583 ❼Business 1 64. 2003 ❼People 1 94.
6379 ❼Accents & Borders I..... 64.



ASD Software ... 30 day MBG

7085 *FileGuard Extended 2.7*–Protect your hard drives, applications, files/folders (including system folder) from unauthorized access, deletion, and/or illegal copying. Now with system usage audit trail. 5 & 10 user also available.... $139.

★Timeworks ... 30 day MBG
7115 ❼Publish It! *Easy* 2.12 w/File-It!... 154.
★T/Maker ... 30 day MBG
Full line available.
❼ClickArt *(bitmapped)*..... ea. 32.
❼ClickArt *(EPS format)*..... ea. 82.
1292 Color Graphics Presentation 1.0.. 109.
★Visual Business Sys. ... 30 day MBG
9867 ❼GraphMaster 1.1..... 189.
★Wildflower ... 30 day MBG
6512 ❼SnapJot 3.01..... 31.
★Zedcor ... 60 day MBG
3986 ❼DeskPaint & DeskDraw 3.0.3... 113.

PROGRAMMING

UTILITIES, HYPERCARD, SECURITY

★Abbott Systems ... 30 day MBG
2515 ❼Calc+ 1.0..... 39.
5236 ❼CanOpener 1.1..... 62.
★Advanced Software ... 30 day MBG
8051 ❼Intouch 1.1..... 39.



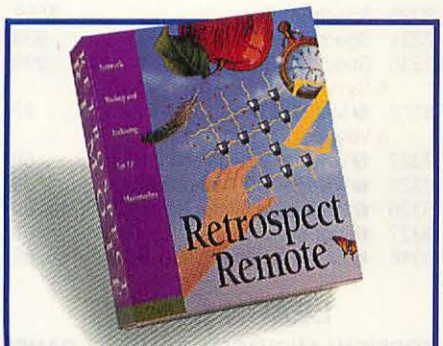
NEW NETWORK 3-PACK!

Advanced Software ... 30 day MBG

8051 ❼*Intouch 1.1*–"Best name-and-address DA," *MacUser*, 4/91 (4½ Mice rating). DA stores names, addresses, notes, prints envelopes and labels, dials phone numbers and more!... $39.
9986 *Intouch Networking (3-Pack)*..... 112.

9986 ❼Intouch Networking *(3-Pack)*... 112.
2808 ❼QuickTools 1.0..... 45.
★Affinity Microsystems ... 60 day MBG
7835 Tempo II Plus 2.0.3..... 105.
After Hours Software
1352 ❼TouchBASE 2.0..... 79.
★Aladdin Systems ... 30 day MBG
6169 ❼Shortcut 1.5..... 45.
6740 ❼StuffIt Deluxe 3.0 *(Dec. '91)*..... 62.
★Aldus ... 30 day MBG
5100 ❼Aldus SuperCard 1.6 *(Oct. '91)* . 195.
★ALSoft ... 30 day MBG
9808 ❼MasterJuggler 1.57 *(Oct. '91)*... 25.
9807 ❼DiskExpress II 2.07..... 49.
9886 ❼MultiDisk 1.27..... 49.
★Alysis Software ... 30 day MBG
2687 ❼SuperDisk! 2.0..... 49.
Apple Computer
1074 ❼System 7 *(with free PCTV video)* . 99.
★ASD Software ... 30 day MBG
7085 ❼FileGuard 2.7 *(1 user) (Oct. '91)*. 139.
7422 ❼*(5 user)* 489. 7423 ❼*(10 user)* 799.
★Baseline Publishing ... 30 day MBG
7783 ❼INIT Manager 1.1..... 34.
3114 ❼INIT Info..... 39.
★Berkeley Systems ... 30 day MBG
5737 ❼After Dark 2.0U..... 28.
2198 ❼More After Dark *(M.A.D)*..... 23.
2196 ❼After Dark & M.A.D. Bundle .... 42.
1541 ❼Stepping Out II 2.02..... 49.
Bright Star Technology
2614 ❼At Your Service..... 30.
★Casady & Greene ... 60 day MBG
2269 ❼QuickDEX 2.3 22. 2528 *(5 Pak)* 99.
★CE Software ... 60 day MBG
1727 ❼CalendarMaker 3.0.1..... 31.
6278 ❼DiskTop 4.01..... 63.
7518 ❼Alarming Events 1.03..... 84.
8024 ❼QuicKeys² 2.1..... 94.
★Central Point ... 30 day MBG
5041 ❼Mac Tools Deluxe 1.2..... 79.
Claris
8734 ❼HyperCard Development Kit 2.1 149.
★Connectix ... 30 day MBG
7830 ❼Maxima 2.0..... 45.
6647 ❼HandOff II 2.2 *(Oct. '91)*..... 56.
★Cyan ... 30 day MBG
2715 ❼Peacock 2.0..... 43.

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Dantz Development ... 30 day MBG

7945 ❼ *Retrospect Remote 1.3*–Provides automatic, unattended workgroup backup using any AppleTalk network. Backs up 10 Macs; add more with Remote 10-Packs. Supports all tape, optical, and cartridge drives ..... $264.

★Dantz Development ... 30 day MBG

5255 ❼Retrospect 1.3 ..... 147.
7945 ❼Retrospect Remote 1.3 ..... 264.
7946 ❼Remote *(10 Pak)* 147. 3112 *(50 Pak)* 649.
3393 ❼DiskFit Pro 2.0 ..... 74.

★Digitalk ... 60 day MBG

5166 ❼SmallTalk/V Mac 1.1 ..... 123.

Dubl-Click Software

7974 ❼ClickChange 1.05 ..... 56.

★ElseWare Corp. ... 30 day MBG

1507 Bar Code Kit 1.0d ..... 135.

★Fifth Generation ... 30 day MBG

4287 ❼PYRO! 4.01 ..... 25.
3955 ❼Suitcase II 1.2.10 ..... 49.
8286 SuperLaserSpool 2.02 ..... 93.
5178 ❼FastBack II or 5725 ❼DiskLock . 118.

★FWB, Inc. ... 30 day MBG

2317 ❼HD Partition or 2319 ❼DeadBolt 57.

★Go Technology ... 60 day MBG

2966 ❼Hot Keys System 7.0 Finder ..... 21.

★Insight Development ... 30 day MBG

6171 ❼MacPrint 1.23 ..... 93.

★JAM Software USA ... 30 day MBG

6089 ❼Smart Alarms w/Appt. Diary 3.07 63.

★Kensington ... 30 day MBG

9301 ❼PassProof *(right)* or 9300 *(left)* ea. 65.

★Kent Marsh Ltd. ... 30 day MBG

9513 ❼FolderBolt 1.02 ..... 73.
2591 ❼The NightWatch 1.03 ..... 84.

★Kiwi Software ... 60 day MBG

6267 ❼KiwiEnvelopes! 3.1.1 ..... 32.
3518 ❼Kiwi Power Windows *(Nov. '91)* .. 50.

★Loop Software ... 30 day MBG

2997 ❼PictureBook Plus 1.0 ..... 75.

★Magic Software ... 30 day MBG

7267 ❼AutoSave II 2.0 ..... 26.
7270 ❼Backmatic 2.0 ..... 50.

★Microcom ... 30 day MBG

8562 ❼Complete Undelete 1.1 ..... 48.
4803 ❼Virex 3.5 ..... 57.
8561 ❼911 Utilities or 2462 ❼Citadel ... 89.

MicroMat Computer Systems

2810 ❼MacEKG 1.0.9 ..... $63.

★Microseeds Pub. ... 60 day MBG

7068 ❼INITPicker 2.02 ..... 34.
2913 ❼Redux 1.63 49. 7116 ❼Rival 1.1.8 49.
2936 ❼HAM 1.0 ..... 49.

★Microsoft ... 30 day MBG

4471 QuickBasic 1.0 ..... 64.

★Nine to Five Software ... 30 day MBG

9767 ❼Reports 2.1 ..... 94.

★Now Software ... 30 day MBG

6925 ❼Now Utilities 3.0 ..... 84.

★ON Technology ... 1 year MBG

6385 ❼On Location 1.02 ..... 75.
9801 ❼Meeting Maker *(5)* 309. 9800 *(10)* 549.
2570 ❼Instant Update *(2)* 309. 2571 *(5)* 619.

★Palomar Software ... 30 day MBG

8210 ❼PLOTTERgeist 2.0 ..... 249.

★Salient Software ... 30 day MBG

7404 ❼DiskDoubler 3.7 ..... 49.

★Solutions, Inc. ... 60 day MBG

3448 ❼SmartScrap & The Clipper 2.1 ... 56.



Baseline Publishing ... 30 day MBG

8881 ❼ *Thunder 7 1.0.4*–Truly interactive spelling & thesaurus program for all applications . $56.
7783 ❼ *INIT Manager 1.1*–Locate, manage & analyze all your start-up documents ..... 34.
3114 ❼ *INIT Info*–The guide to INIT compatibilities and system conflicts ..... 39.

★Symantec ... 30 day MBG

5176 ❼Symantec AntiVirus for Mac *(SAM)* 66.
5724 ❼Symantec Utilities for Mac *(SUM II)* 96.
6748 ❼Norton Utilities for the Mac 1.1 ... 87.
3598 ❼Norton Utilities for Mac & SAM .. 118.
3421 ❼THINK Pascal 4.0 ..... 165.
2688 ❼THINK C 5.0 ..... 199.
9957 ❼THINK Reference 1.0 ..... 69.

★Synex ... 30 day MBG

7147 ❼MacEnvelope 5.1 ..... 57.
6666 ❼MacEnvelope + 2.0 ..... 185.

★Tactic Software ... 30 day MBG

8964 ❼MasterFinder 1.2 ..... 49.

★Teletypesetting ... 30 day MBG

8058 ❼TScript 3.0 91. 3014 ❼Deluxe . 315.

★TGS Systems ... 60 day MBG

6667 ❼Prograph 2.5 *(Oct. '91)* ..... 309.

★Wolfram Research ... 30 day MBG

8273 ❼Mathematica Enhanced 2.0 ... 789.



Freesoft ... 60 day MBG

6115 ❼ *White Knight 11*–11 award winning communications program that supports XMODEM, YMODEM, ZMODEM, Kermit, and CompuServe Error Correcting protocols. Includes Okyto 1.0 and a free subscription to GEnie $85.

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Adobe Systems

8794 ❼Adobe Type On Call CD/ATM .... 47.
9443 ❼Adobe TOC & Porta Drive Bundle 639.

CD Technology

2321 CD-ROM Caddy .. 11. 2533 *(5)* .. 49.
8057 Porta Drive CD-ROM ..... 599.

★Cyan ... 30 day MBG

2717 ❼Cosmic Osmo 1.1 *(CD-ROM)* ... 37.

★Discovery Systems ... 60 day MBG

9967 Nautilus *(subscription kit, CD-ROM)* 20.
9968 Birds of North America *(CD-ROM)*.. 26.
9965 Sherlock Holmes on Disc *(CD-ROM)* 26.
9966 Shakespeare on Disc *(CD-ROM)*... 26.
1874 Mammals of N. America *(CD-ROM)* 52.



Symantec ... 30 day MBG

3598 *Norton Utilities for Mac & SAM Bundle*–Two essential utility packages at a new low price! SAM provides complete virus protection, Norton Utilities gives you tools to keep your Mac running smoothly ..... $118.

350C

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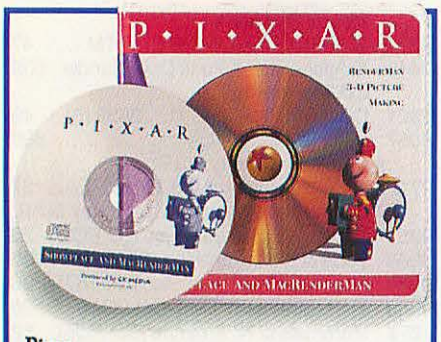
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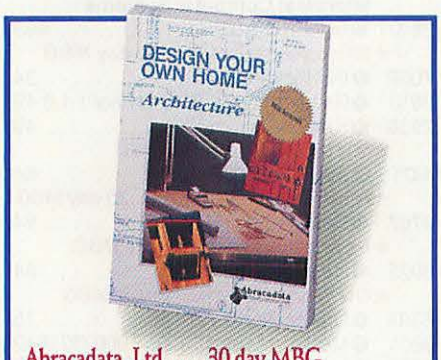
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3316 ❼Exotic Japan 1.0 *(CD-ROM)* . . . . 69.

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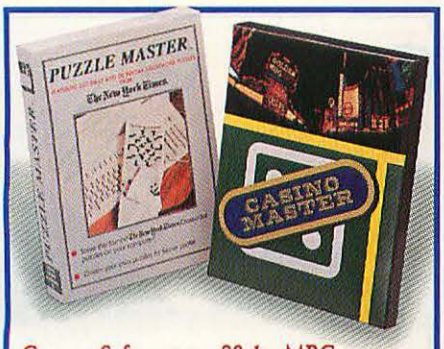
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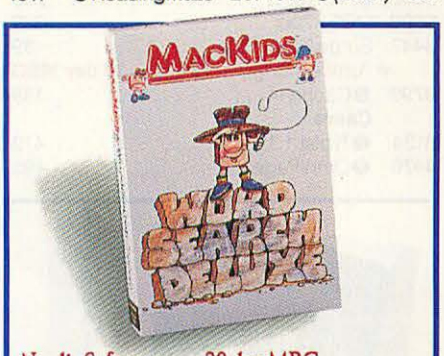
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❼ACT, GMAT, GRE, or SAT Prep *ea.* 29.
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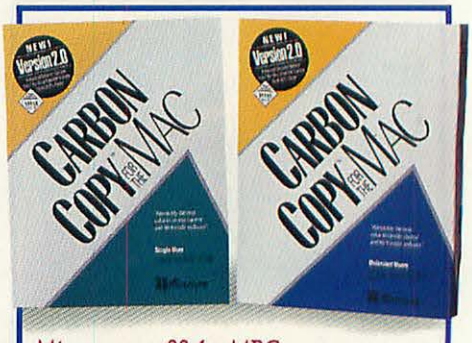
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9961 PhoneNET Card PC ..... 209.
6273 PhoneNET StarConnector 10-Pack. 129.
4869 PhoneNET Connector 10-Pk *(DIN8)* 198.
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8945 ❼TelePort/FAX ..... 185.
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7391 ULTRA 96 Modem ..... 669.
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★Synergy ... 30 day MBG
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2996 ❼Traffic Controller Personal ..... 65.
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1582 GraceLAN. 295. 1584 Corporate. 719.
1583 GraceLAN 50 Node Upgrade .... 119.
★White Pine Software ... 30 day MBG
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3541 Mac 241 or 3544 Exodus .... *ea.* 199.
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1176 MX2400S Modem *(w/SendFax 9600)* 79.
2310 FX9624 Send/receive Fax/Modem 119.
3576 FX9624V Send/receive Fax/Modem 169.



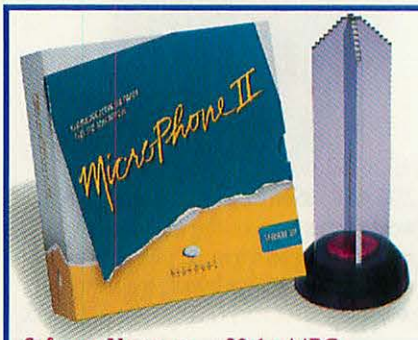
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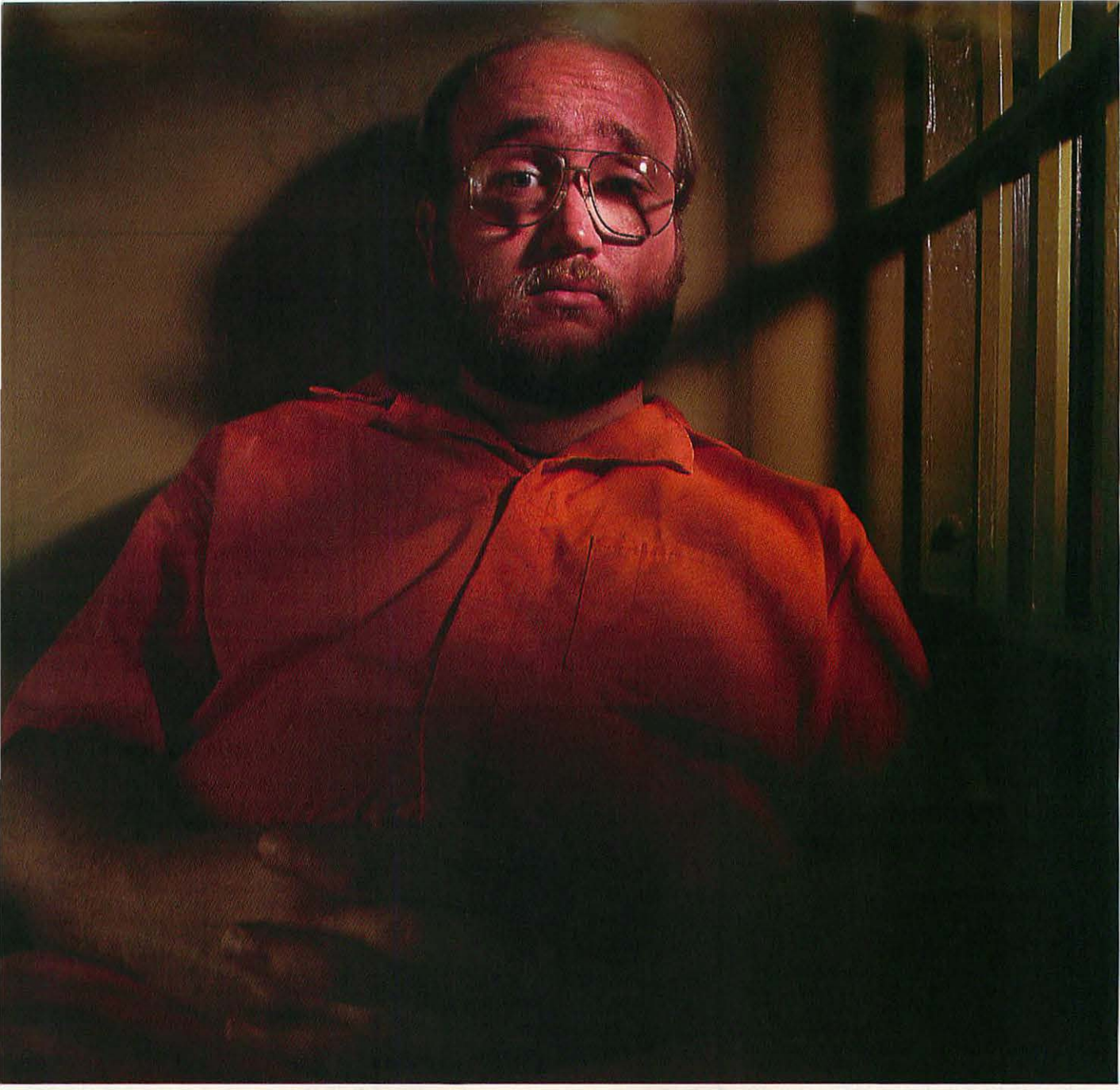
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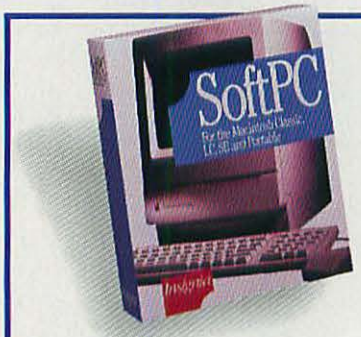
4973 Power Tree 20..... 27.
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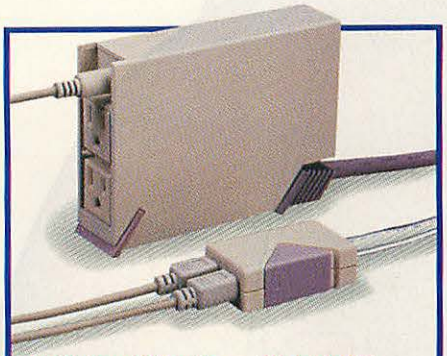
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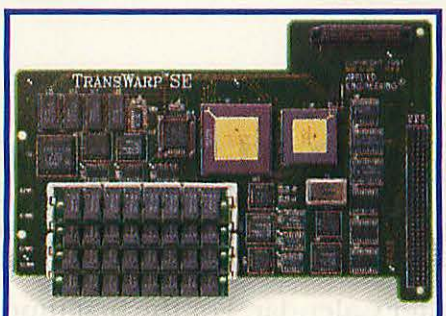
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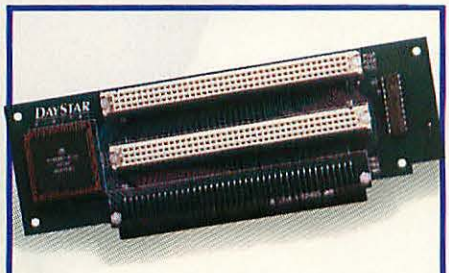
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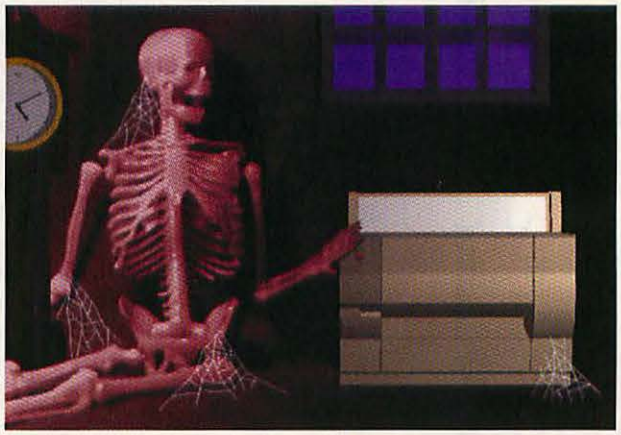
The Meaning of Slow

PASSING THE TIME WITH APPLE'S STYLEWRITER

BY STEVEN LEVY

Owning an Apple StyleWriter is like having a recalcitrant pet, a puppy perhaps permanently damaged by premature separation from its mother. It can make your heart leap with its sporadic charm, but its general misbehavior makes you want to take a trip to the river to drown it. In the case of the StyleWriter, thank God, the problem is not errant bladder control or a propensity to gnaw on the couch. The problem is speed. Oops. Did I somehow foolishly manage to include the word *speed* in a sentence referring to the StyleWriter? The only relationship existing between speed and the StyleWriter, as the guy in "Wayne's World" would say, is . . . NOT!

If you like watching paint dry, or trees grow, or continents drift, you will love Apple's StyleWriter. As a one-time owner of an original 128K Mac, I thought I knew slow, but having a StyleWriter in my house for even a few weeks demonstrated that I had much to learn about the concept. In fact, during the long periods of cogitation it has provided me while printing documents and tying up my Macintosh, I have come to the conclusion that the StyleWriter is not, as Apple insists, simply a compact, affordable, "professional-quality" ink-jet printer, but a learned dispenser of wisdom. Like Buddhists, Native Americans, and Heinz ketchup commercials, it instructs patience in all things, especially spreadsheet documents.



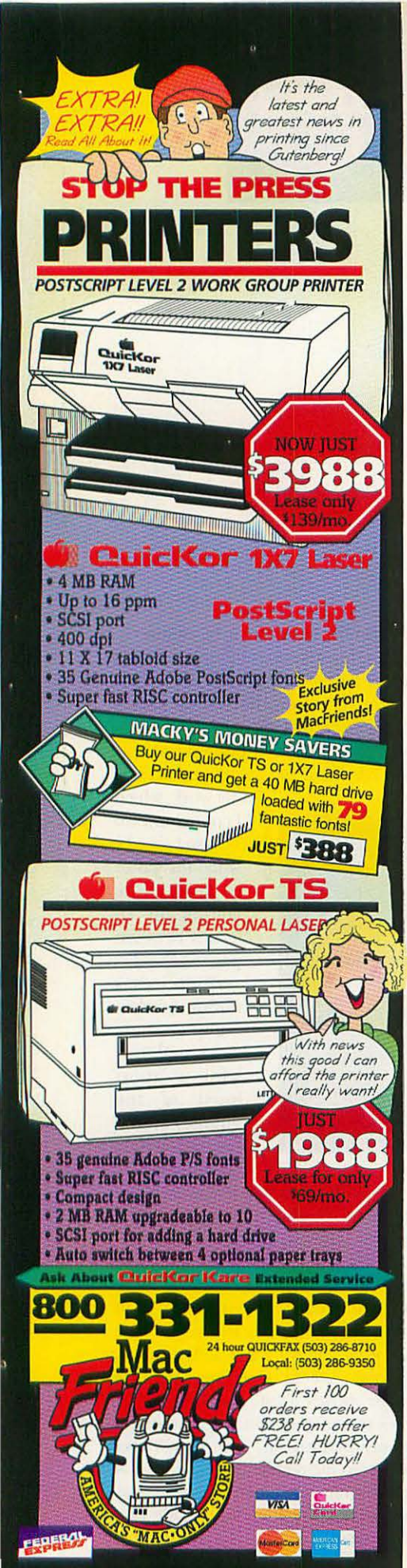
SCOTT BALDWIN

While you meditate, the StyleWriter speaks. I can hear it now, softly growling as I attempt to compose this column while it's printing "in the background." (More on the spooler later.) At first I ignored these sounds, naively thinking they were just the noises made while hot jets of ink sprayed on the paper one painstaking line at a time. Then it dawned on me that the StyleWriter is different from any other Apple printers.

My old ImageWriter, though no speed king itself, projected an industrial clatter. It was a shot-and-a-beer type of printer, blue-collar all the way. Its sound was not one of communication, but the consequence of hard work, hammer on steel. My LaserWriter, on the other hand, was a Yuppie knowledge-engineer type; its soothing whine as it printed was sort of a Windham Hill accompaniment to my work, which I could perform seamlessly while the printer did its job. During the silences between pages, the LaserWriter was obviously calculating its next move, and then with a short burst of the engine, it impressed words upon paper.

But the StyleWriter's sounds are different. It grabs the paper with a greedy meshing of gears, then momentarily halts, almost abashed at its eagerness. Finally, it emits a high-pitched scraping noise as its print head moves across the page. The sound is annoying but stifled, like a Victorian sneeze. One line. Then the paper moves a bit, and the printer ekes out another line. Every so often, to my bafflement, the StyleWriter pauses in the middle of a page. It took me a while to figure out what was happening, but then it all made per-

(continues)



Circle 109 on reader service card.

fect sense. The StyleWriter was *reading* the documents as they printed! This printer is not a laggard hunk of plastic but a careful reader, like those who snub Evelyn Wood courses. The device luxuriates in prose. Every so often, it stops and ruminates on a particularly felicitous passage.

The Odd Couple

Whoa. Have I taken leave of my senses, thinking a printer can actually read? Sorry. Having a StyleWriter around does weird things to your head. It is definitely an odd piece of machinery. It even looks strange. It is compact, covering roughly the same amount of real estate as a keyboard and weighing in at under 8 pounds. But for reasons best understood by either the wizards who designed it at Apple or the production geniuses who built it at Canon in Japan, the StyleWriter comes in two pieces—a sheet feeder and the printer itself.

If you are the type of person who needs the visceral contact of personally handing the printer each page as it prints, you don't need the whole thing. But almost everyone else, I'll guess, puts the pieces together. They are arranged in such a way that even after you snap them together, like a giant Lego structure, you're not sure it's right. It looks as if it's perpetually sideways. And then you have to add the finishing touches—first attaching a little wire-hanger-like thingamabob (called the paper support) to the top of the sheet feeder. Then you open up the printer, snap in an ink cartridge, figure out how to get the paper in the sheet feeder (tricky at first), open up the flimsy plastic output tray that catches the paper (designed with a tip of the hat to Rube Goldberg), and you're off. Maybe.

You are off only if your Macintosh has System 6.0.7 or later; the StyleWriter supposedly doesn't operate on anything earlier because it requires TrueType (although I know people who claim to get around this by using Adobe Type Manager). This is fine if you have converted to System 7, but many of the Classic, SE, and Plus people for whom the StyleWriter is putatively designed have not made, and cannot make, that upgrade. They must search for the elusive 6.0.7, an upgrade that was the prime Mac system software for a few months last year. (This system software is not included in the StyleWriter package.)

Did Someone Say Slow?

So it's set up and it's ready to print. Did I mention that it was slow? The StyleWriter manual estimates "approximately one-third page per minute in normal mode," which is a nice way of saying it takes three minutes to print a page, and an hour for a normal 20-page document. But since plain users don't gauge operation by stopwatches or hourglasses, but by how things feel, I must abandon metrics to convey the state of mind triggered by using a StyleWriter. Printing a 4-page document means this: leave the room and make a cup of coffee. If you have a Mac II or above, read the sports page while you drink your coffee, then return. If you have a Classic or a Mac Plus, drive into town for your cup of coffee. Schmooze before returning.

If you are printing a long document, something that will test the limits of the 50-sheet paper feeder on the StyleWriter (50 sheets doesn't sound like too much, but it lasts a long time), I suggest you consult your local theater guide for a good feature.

Oh, there is a draft mode for more rapid printing. Apple shows its sense of humor by referring to the standard speed as "best" and the draft mode as "faster." Sort of like calling a small box of detergent "Jumbo." Draft mode is indeed almost twice as fast, but the output has a washed-out quality.

The other option is actually using the Mac to create new work while the StyleWriter is printing. For the first few months of the StyleWriter's existence, that was not an official option, as the StyleWriter could not use the background-printing feature so slickly utilized by LaserWriters (although some third-party spooler software was available). Just as I was finishing this column, Apple released new software that reportedly brings StyleWriters into the age of background printing. Unfortunately, it didn't work too well for me. On a relatively powerful Mac, a IIcx, the cursor lagged seriously when I used applications while print-

(continues)

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ing, and the performance was jerky and halting. The act of word processing was like watching a movie with the visuals badly out of sync with the audio. Background printing with a less-powerful Mac is out of the question. When I tried it with a Mac Plus, I could type entire paragraphs without a word showing up on the screen. It was like composing a document in a different time zone.

Then there is the price of a StyleWriter. It lists for $599; the street price is around $450. The street price of an Apple Personal LaserWriter or a GCC Personal LaserPrinter is slightly more than twice as much, around $1000. Not too long ago, you had to figure at least $2000 for a laser printer that worked with a Macintosh. With a lousy $500 or so separating the StyleWriter from a good laser printer, why lowball it? (Unless, of course, you don't have the $500 to spend.)

My Type of Type

There is one other thing I should mention about the StyleWriter. Its output. Once the StyleWriter is set up, its software installed, and the arduously lengthy printing process is completed, you get a piece of paper with print on it that is simply . . . gorgeous. Startlingly so. You may be excused for mistaking it for output on the more expensive LaserWriter. No jaggies. Clear type. Nice.

I have experimented with the StyleWriter, using Apple's TrueType fonts and PostScript fonts accessed by Adobe Type Manager (which works nicely with the StyleWriter). In all cases the results are more than acceptable; they are impressive. They shame the ImageWriter and do not overly flatter the LaserWriter.

One might even be tempted to say that the StyleWriter is worth the wait. But it's not. If you value your time, you will get with the program and buy some sort of laser printer, even if it puts you into deep debt. If worse comes to worst, your bankruptcy filings will look beautiful. And you won't have cause to meditate on the meaning of slow. ■

Macworld *columnist Steven Levy is writing a book on artificial life.*

We asked people what they wanted from the next generation of Apple technology. They had only four modest requests.



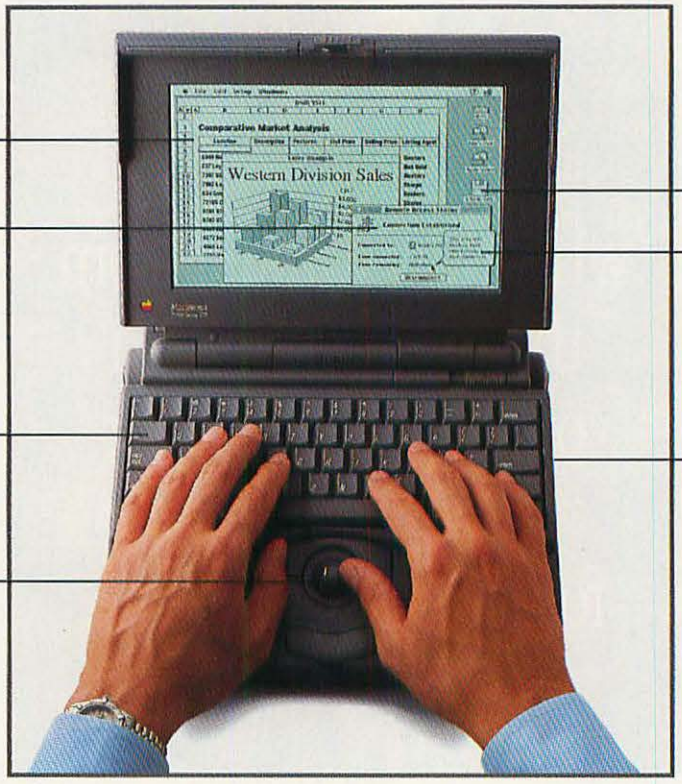
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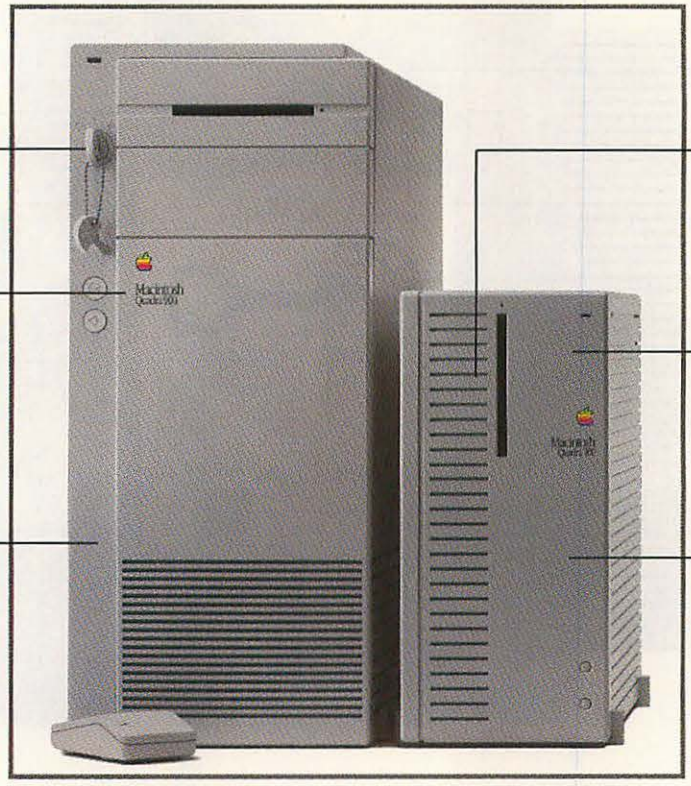
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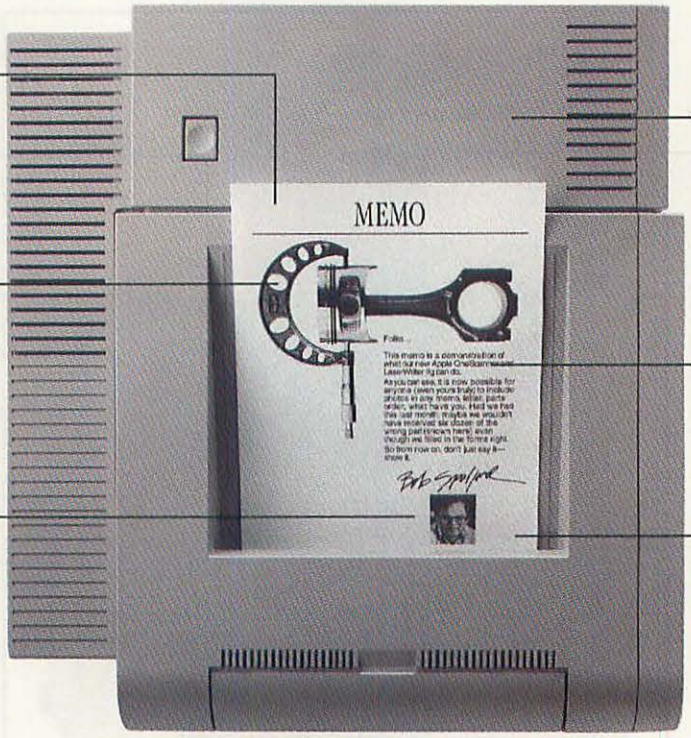
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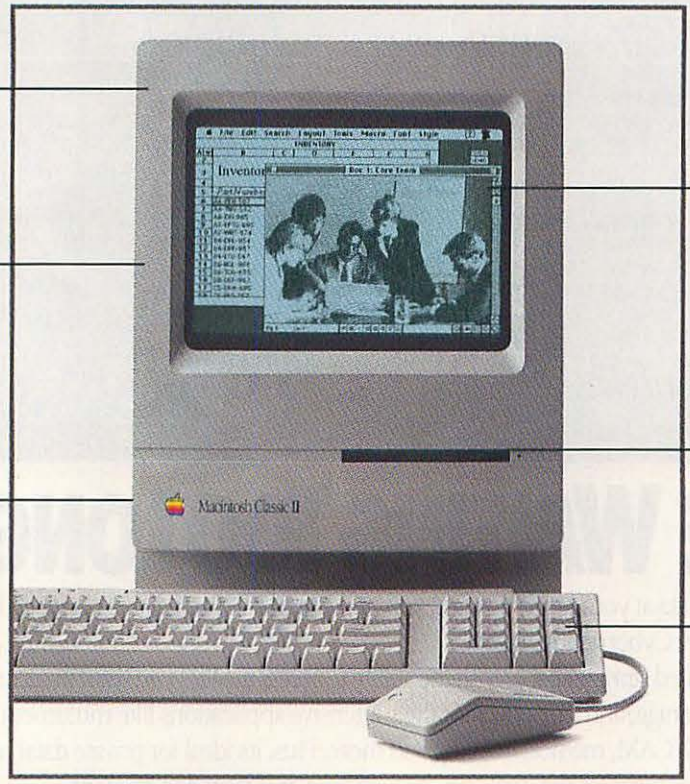
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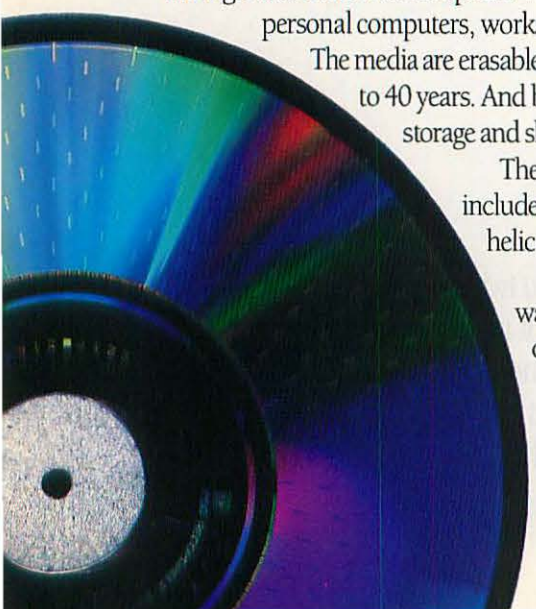
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Circle 188 on reader service card



Gimme Data

IF A BACKUP GOES BUST, DATA-RECOVERY SERVICES MAY BE ABLE TO SALVAGE CRITICAL FILES

BY DEBORAH BRANSCUM

There are more choices than ever for backing up data. Removable-cartridge systems based on technology from SyQuest, Rodime, and Iomega are becoming increasingly common. Tape drives are also becoming more popular, especially for networks (see "Fast-Forward Storage," *Macworld,* November 1991). And there are a growing number of erasable optical drives. Although it's easier than ever to back up, that doesn't guarantee data safety—no storage system is immune to problems. But when bad things happen to good data, recovery services may be able to help.

Novato, California–based DriveSavers (415/883-4232) is a Mac-only data-recovery and drive-repair service founded last year by Scott Gaidano and Jay Hagan, former Jasmine employees. DriveSavers is recommended by SuperMac, SyQuest, and Ricoh for data recovery from the companies' hard drives, removable-cartridge drives, and optical drives, respectively. DriveSavers can also pull data off Bernoulli-based devices, WORM drives, and flopticals, according to Gaidano. DriveSavers has worked with Ricoh, Max Optics, and Sony to develop techniques for recovering information from optical devices.

It might seem surprising that data recovery should ever be necessary for optical drives, because such information (unlike data on hard drives and floppies) isn't vulnerable to stray magnetic fields. Moreover, head crashes don't happen because of the considerable distance between the optical read-write head and the medium. Still, opticals have their own problems, says Gaidano, including mechanisms not recognizing cartridges, scratched media, and misalignment within a cartridge as a result of being dropped. And like any storage device, an optical's file directory can get scrambled.



ROBERT HOLMGREN

Jay Hagan (left) and Scott Gaidano of DriveSavers.

DriveSaver's standard service costs $75 per hour, with a maximum three-day turnaround. Express service is $125 per hour. There's a one-hour minimum charge, whether or not data is recovered. Typical costs range from $125 for data recovery on a 20MB device to $300 for a 300MB job.

Another California company, Mipro III, located in Redwood City (415/306-1100), has been in the business of data recovery and drive repair for six years; more than half its customers are Mac owners. In addition to conventional drives, Mipro III has recovered data from SyQuest- and Bernoulli-based devices and plans to move to floptical and magneto-optical recovery in the future.

The average data-recovery charge is $400, according to Mipro president Steve Burgess. The hourly charge is $95; a job on an 80MB hard drive runs between two and three hours. The minimum charge is $95.

Computer Peripheral Repair of Hypoluxo, Florida (407/586-0011 or 800/765-9292), recovers data from SyQuest- and Bernoulli-based devices, as well as floppies and hard drives. Mac devices make up most of the company's business. The price is $75 per hour, with a one-hour minimum. The average cost ranges between $300 and $500. The advertised turnaround is ten days, but it can be as fast as 48 hours, according to com-

(continues)

pany vice president Tony Alvarez. The 48-hour Expedite service is available for an additional $50.

At least two storage companies also do data recovery. Mirror Technologies (612/633-4450) of Roseville, Minnesota, charges $130 per hour for data recovery on 300MB devices and larger; there are flat fees for smaller drives. Recovering data from a 40MB drive runs $147; from an 80MB drive, $177; and from a 100MB drive, $217. Mirror also recovers data from SyQuest-based devices. Iomega, in Roy, Utah, markets Bernoulli-based storage systems and offers data recovery for its products. If the data can be recovered within three hours, charges are $300 for a 44MB Bernoulli cartridge, $390 for a 90MB Bernoulli cartridge, and $570 for data recovery on a 650MB Lasersafe CD ROM. It's an additional $100 per hour after three hours, but only three cartridges in the past year have required more time, according to the company. There's also a 24-hour-turnaround service for an extra $150.

Bringing Back Tape

The Mac is a relatively new platform for tape drives, which may be why I was unable to locate any data-recovery services that specialize in Mac customers. Those I did locate started business by converting data from one tape format to another and have added data recovery to their services. Data recovery on tape drives can be particularly tricky because of varying formats, software, manufacturers, and models. So services that are serious about recovery must accumulate what one company president called a "museum of ancient machines."

In addition to compatibility issues, tape cartridges may face other problems, from despooling (when tape unrolls from one end of its cartridge), to stretching, to literally wearing out. "The average tape won't last but about three years," says Paul Clay III, vice president of marketing for Tropus (502/895-6667 or 800/426-3776) of Louisville, Kentucky. Unlike optical drives, magnetic media are great for temporary storage but not for permanent storage, he says.

Tropus was founded in 1983 and started doing data recovery in 1987. The company can recover data from tape systems manufactured by Teac, Maynard, Tecmar, Mountain, and Colorado Memory Systems. Some 100 Mac owners have used the service in the past year. Tropus also recovers data from optical drives, SyQuest- and Bernoulli-based systems, and floppies. The charge is $88 per hour, with a one-hour minimum. Clay says the average is three hours, but recoveries have run as long as 30 hours.

Computer Conversions (619/693-1697), in San Diego, recovers data from several formats, including DC2000 and DC6000 ¼-inch tape formats. Company president Lee Tydlaska says his service is necessary because people don't use their tape

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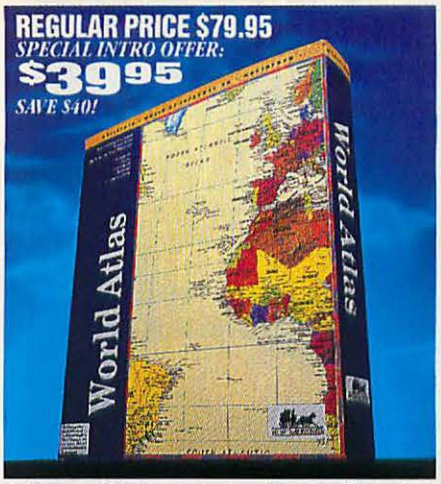
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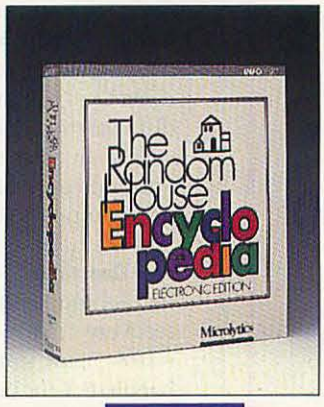
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backup systems properly. He cites examples of individuals who use the same tape cartridge for five years, literally wearing it out, or people who faithfully back up but don't verify that the tape has been written properly—and discover too late that it was not.

Computer Conversions has done no more than five Mac-based tape recoveries in the past year, but hopes to expand. "Right now we've only got five Mac formats, but there are probably 50 out there and we're buying them slowly but surely," says Tydlaska. A setup fee of $150 plus $15 per restored megabyte is charged for data recovery at Computer Conversions, which has done government work and qualifies as a secured facility, with an alarm system and safe. (In January, the company will begin offering a tape-verification and off-site storage service to Macintosh users.)

If it's a simple problem, 3M may be able to help 3M tape cartridge users. The company maintains a data-storage-products hotline at 800/328-9438. According to company spokesperson Philip Hage, if a cartridge despools, 3M can reattach it, retension it, record the data from it, and return a new cartridge to the customer free of charge. 3M will also try to help if one of its cartridges has been physically damaged, says Hage. Call the hotline for more info.

Just Floppies

Many data-recovery services can salvage floppies, but Polaroid offers a specific DataRescue service (707/578-3200 or 800/443-5873) free of charge to those who buy Polaroid-brand DataRescue Diskettes. Customers who lose data can return a disk for data recovery and a replacement floppy, usually within 48 hours, according to the company. Polaroid returns the customer's floppy or set of disks via the same delivery service the customer used to send them. Non-Polaroid users can get data recovery for $100 per floppy.

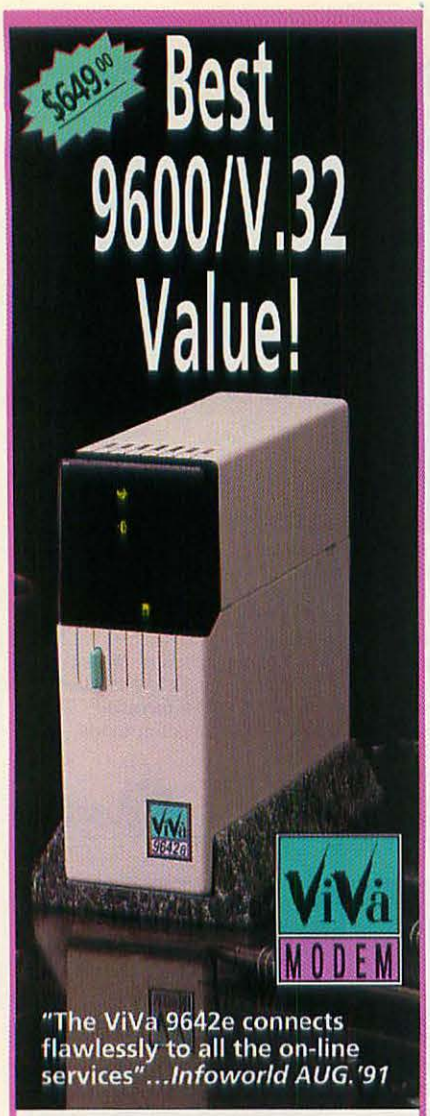
Ask Questions

Before you send a device to a data-recovery service, ask some questions.

- How many similar cases have been handled? Your odds of success go up with the experience of the service.
- How successful has the company been in recovering data from devices like yours, and how often has it been able to recover 100 percent of the data? Often companies cite an overall success rate of higher than 90 percent, which refers to the overall percentage of times the company was able to recover *any* data.
- Does the company have a relationship with the manufacturer of your device? Manufacturers can aid data-recovery services by sharing valuable technical information.
- Is the company equipped to do the job? If you need data recovery from a hard drive, for example, does the service have access to the specific controller board your drive uses? If you have an alternative storage device, does the service have access to a working model of that particular device, such as a DC2000 tape drive? If the answer is no, think twice before sending your device to that particular service. The manufacturer of your device may be able to steer you to a more experienced company.
- How long does the service keep the data? If the restored data is lost in the mail, will you be able to get a duplicate copy? Most services keep restored data for at least a week; others maintain it far longer.
- How is your data kept confidential? Some companies will sign nondisclosure agreements, particularly important for businesses that are trying to recover proprietary data.

Data recovery should be thought of as a useful but expensive last resort. "With a good backup strategy, you'll never need to do a disk or hardware recovery," says Larry Zulch, president of Dantz Development, which makes Retrospect backup software. If you need direction, read "Getting Started with Disk Maintenance," *Macworld,* March 1990. And there are several fine utilities that can help you recover lost data. But one word of warning: those programs can also alter data so that it becomes unrecoverable. If you can't easily recover your data and can't figure out what's wrong, call a professional. For information on additional data-recovery and repair services, see *Conspicuous Consumer,* March 1990.

(continues)



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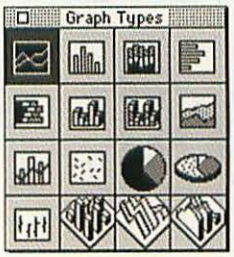
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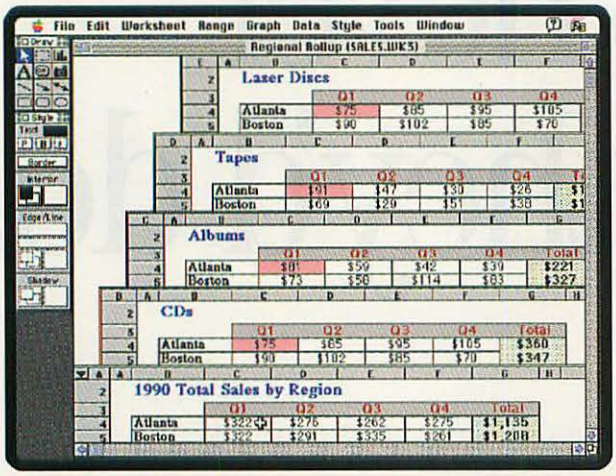
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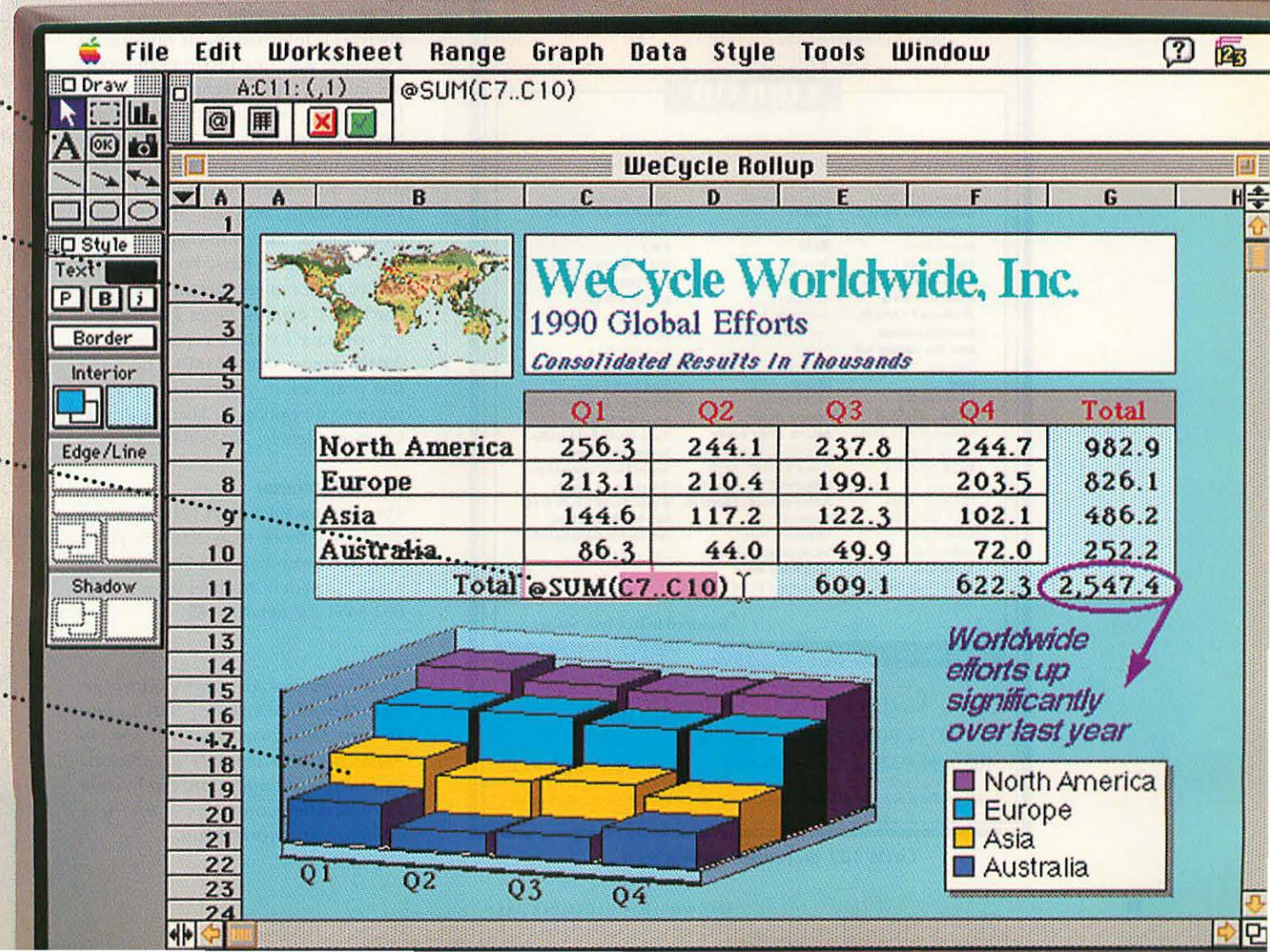


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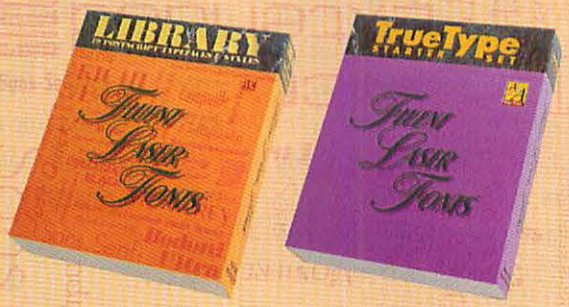
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- Sans Serif Italic
- Sans Serif Book
- Sans Serif Book Italic
- Sans Serif Demibold
- Sans Serif Demibold Italic
- Sans Serif Bold
- Sans Serif Bold Italic
- Sans Serif Bold Condensed
- Sans Serif Bold Condensed Italic
- Sans Serif Ex. B.
- Sans Serif Ex. B. Ital.
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Circle 137 on reader service card.

SERVICE HERO

At the Macworld Expo in Boston in August, reader Dan Kittay of Albany, New York, bought a copy of Letter Drop, a $19.95 game from Human Interactive Products. After Kittay installed the game on his Mac, he noticed in the About Box that it was a demo version. The game ended after only two rounds, with information on getting the full version. Kittay called Human Interactive Products and left a message explaining the problem. The company president, James Olsen, responded with an apology, a full working copy, *and* a full refund. Kittay writes that it's nice to find a company "willing to admit a mistake and leave a positive impression."

Extended Warranties

Microtech International is offering an extended warranty program that covers internal and external hard drives from Apple, plus external hard drives from Cutting Edge, CMS Enhancements, Ehman, EMac, FWB, GCC, Jasmine, MicroNet, Mirror, PLI, Plus Development, Procom, and Storage Dimensions. The one-year extended warranty, which must be purchased before the original warranty on a new hard drive expires, costs $59 to $219 for coverage for drive capacities from 20MB to more than 651MB. Check the fine print before you sign up. There's also a repair option for Jasmine drives; for more details, 203/468-6223.

AMUG Fundraiser

The Arizona Macintosh User Group is auctioning more than 200 new products on November 9 in Phoenix. Call AMUG president Michael Vean at 602/892-5454 for details. M

Send nominees for sainthood to Service Heroes, Macworld, *501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop* Conspicuous Consumer *a line if a company is ignoring you.*

At last, Macintosh and UNIX are becoming fast friends.

And they're doing it quicker and easier than ever before, thanks to AlisaTalk for UNIX. The new Mac-to-UNIX software from the award-winning originators and world leaders in Mac-to-VAX connectivity software.

At last, Macintosh users can enjoy the phenomenal speed and power of the most advanced RISC processors from Sun, Digital, and IBM, as well as the reliability of UNIX computer systems. Along with unlimited file and printer sharing, unrivaled terminal emulation, and electronic mail.

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AlisaTalk for UNIX servers run under the UNIX, ULTRIX, and AIX operating systems, and all network administration tasks can be accomplished from any Mac on the network. In addition, all network printers are accessible from any combination of Macs, SPARCstations/systems, DECstations/servers and RS/6000s.

For more information, contact us about AlisaTalk for UNIX.

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Leading publications have given us welcome recognition, but with a 98 percent satisfaction rate, our biggest supporters are Bernoulli users.

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Circle 240 on reader service card

UPDATES

This section lists the latest versions of selected Mac applications that were announced by the time we went to press. To have products considered for this section, send a press release to Updates, Macworld, *501 Second St., San Francisco, CA 94107, or fax it to 415/442-0766.*

PRODUCT	V.	REQ.	★	$
4TH DIMENSION	2.2	1MB/6.0		$99
A4	3.0	2MB/6.0.5		$395
AATRIX CHECKWRITER II	3.02	512K/4.1		*
ACCOUNTANT, INC. PROFESSIONAL	2.1	1MB/6.0.3		*
ACCUTEXT	2.0	4MB/6.0.2		*
ACTA 7	7.0	512KE/6.0.5		$33.50
ADDMOTION	1.0	2MB/6.0.5		NA
ADDRESS BOOK PLUS	2.0	1MB/6.0.2		$25
ADOBE ILLUSTRATOR	3.0	2MB/6.0.3	2/91	*
ADOBE PHOTOSHOP	2.0	2MB/6.0.2	9/91	$199
ADOBE TYPE MANAGER	2.0	1MB/6.0.2		FREE
AFTER DARK	2.0	512KE/4.1	5/91	*
AGFATYPE	2.0	2MB/6.0.2		FREE
ALARMING EVENTS	1.0.3	1MB/6.0.2	11/91	$15
ALDUS DIGITAL DARKROOM	2.0	1MB/6.0	9/91	*
ALDUS FREEHAND	3.0	1MB/6.0.3	8/91	*
ALDUS PAGEMAKER	4.0.1	1MB/4.1		FREE
ALDUS PERSUASION	2.0	1MB/6.0.5		*
ALDUS SUPER 3D	2.5	2MB/6.0.5		*
ALDUS SUPERPAINT	3.0	1MB/6.0.5		$65
AMAZING PAINT	1.0.1	512KE/6.0.4	1/91	$15
ANTITOXIN	1.4	512K/3.2		$15
APPLESHARE FILE SERVER	2.0	512K/3.2		*
ASHLAR VELLUM	2.0	4MB/6.0.2		$95
ATONCE	1.2	1MB/6.0.5		*
AUDIOMEDIA	2.02	2MB/6.0.7		$29
AURACAD	3.01	1MB/4.0		$90
AUTOSAVE II	2.0	512KE/4.2		*
A/UX	2.0	4MB/6.0.5		*
BACKFAX	1.5.1	1MB/6.0.3		$25
BACKMATIC	2.0	1MB/4.2		*
BILL-IT	2.6	1MB/6.0.3		*
BITSTREAM TYPEFACE LIBRARY	2.0	1MB/6.0		*
BUSINESS SENSE	1.4.1	1MB/6.0		*
CA-CRICKET PRESENTS	2.0.1	1MB/6.0		*
CALENDAR	1.1.2	512KE/6.0	11/91	FREE
CANOPENER	1.1	512K/3.0		FREE
CANVAS	3.0	1MB/6.0.2		*
CAPTURE	4.0	128K/4.1		$30
CARBON COPY MAC	2.0	1MB/6.0.5		*
CAT III	1.1	1MB/6.0		*
CLARIS CAD	2.0.2	2MB/6.0		$79
CMS UTILITIES	7.0	2MB/7.0		$25

PRODUCT	V.	REQ.	★	$
COLOR MACCHEESE	2.07	1MB/6.0.5		$15
COLORSTUDIO	1.5	4MB/6.0.5		*
COMPUSERVE INFORMATION MANAGER	1.5	1MB/4.1		*
COMPUSERVE NAVIGATOR	3.0.4	512K/4.1		*
CONCERTWARE+	4.0	512KE/4.2		$15
CORRECT GRAMMAR	2.0	1MB/4.2		*
DATACLUB CLASSIC	2.0	2MB/6.0		*
DATA SHAPER	1.2	1MB/6.0		$40
DECK	1.03	2MB/6.0.7	4/91	FREE
DELTAGRAPH PRO		2MB/6.0.5		$75
DELUXEMUSIC CONSTRUCTION SET	2.5	512K/6.0.2		*
DESCARTES	1.04	2MB/6.0.3	6/91	FREE
D.E.S. DOCUMENT EXCHANGE SYSTEM	4.1	1MB/6.0		*
DESIGNCAD	3.0	2MB/6.0.5		*
DESIGNCAD 2D/3D	3.0	2MB/6.0.5		$50
DESIGNSTUDIO	2.0	1MB/6.0	11/91	*
DESKPAINT	3.03	1MB/4.2		FREE
DIGITAL DARKROOM	2.0	1MB/6.0.4		$80
DISKDOUBLER	3.7	1MB/6.0.2		$15
DISKEXPRESS II	2.07	1MB/6.0		*
DISKFIT AND NETWORK DISKFIT	2.0	1MB/6.0	7/91	*
DISKTOP	4.01	1MB/6.0		*
DISPLAY ADBUILDER	1.1	1MB/6.0.3		*
DOLLARS & SENSE	5.0	512KE/3.2		*
DOUBLE HELIX	3.5	1MB/6.0		$99
DREAMS	1.1	1MB/6.0.2		*
DYNAPERSPECTIVE	2.04	2MB/6.0.4		FREE
DYNODEX	2.0	1MB/6.0		$25
EASY COLOR PAINT	2.0	1MB/6.0.2		*
EMPOWER II	4.01	1MB/4.2		*
ENCORE	2.0.7	2MB/6.0.2		*
ENHANCE	2.0	2MB/6.0.3	11/91	$50
EVOLVE	1.1	2MB/5.3		$25
EZ VISION	1.0	1MB/6.0.3		NA
FASTBACK II	2.1	512KE/4.1		$30
FAST FORMS	2.0	1MB/6.0		$25
FASTLABEL	2.02	1MB/6.0		*
FASTTRACK	1.5	512KE/5.5		$20
FAXGATE (MICROSOFT MAIL)	3.0	1MB/6.0.5		$9/workstation
FAXGATE (QUICKMAIL)	1.5	1MB/6.0.5		$9/workstation
FILEGUARD	2.7	1MB/4.2		$18

PRODUCT	V.	REQ.	★	$
FILEMAKER PRO	1.02	1MB/4.2	2/91	FREE
FILEVISION V	1.1	1MB/6.0.2		*
FILMMAKER	2.5	5MB/6.0.3	3/91	*
FINALE	2.6	1MB/6.0.2		FREE
FINDSWELL	2.01	512KE/3.2		*
FLEXICAD	2.20	5MB/6.0.4		*
FONTMONGER	1.0.5	2MB/6.0.2	10/91	FREE
FONTOGRAPHER	3.3	1MB/4.0.3		*
FONTSHARE	2.2	1MB/6.0		FREE
FONTSTUDIO	2.0	1MB/6.0.5		*
FORM Z	2.0	2MB/6.0		*
FOXBASE+/MAC	2.01	1MB/6.0		FREE
FRAMEMAKER	3.0	1MB/6.0	1/91	*
FREEDOM OF PRESS LIGHT	3.0.1	2MB/6.0.3		FREE
FREEDOM OF PRESS PROFESSIONAL	3.0.2	4MB/6.0.3		$100
FULL IMPACT	2.0	1MB/6.0		$50
FULLWRITE PROFESSIONAL	1.5	2MB/6.0.2		*
GENERIC CADD	1.1	1MB/6.0.5		*
GEOQUERY	2.03	1MB/6.0		$125
GOFER	2.0	1MB/4.1		$25
GRACELAN	2.0	1MB/6.0.5		*
GRAMMATIK MAC	2.05	1MB/6.0		$15
GREAT GANTT	1.4	1MB/6.0		*
GREAT PLAINS ACCOUNTING SERIES	6.0	1MB/4.2		*
GUIDE	2.0	512K/4.1		$50
HAND-OFF II	2.2	1MB/6.0.5		$35
HYPERANIMATOR	1.5.2	1MB/6.0.3		*
HYPERCARD	2.1	1MB/6.0.3		$49
HYPERDA	2.0	512K/3.2		*
HYPERWINDOWS	1.2	1MB/6.0.2		$20
ICON-IT	2.1	1MB/6.0.2		*
IF:X FORMS DESIGNER	1.1	1MB/6.0		FREE
IGOR	1.2	2MB/4.1		$35
IMAGESTUDIO	1.5	1MB/6.0		$99
INFINI-D	1.1	4MB/6.0.4	9/91	FREE
INFOLOGIC ENVELOPE	1.1C	512KE/4.0		$5
INITPICKER	2.02	1MB/6.0		$10
INSIGHT EXPERT ACCOUNTS PAYABLE	2.1.1	1MB/6.0		*
INSIGHT EXPERT ACCOUNTS RECEIVABLE	2.2	1MB/6.0.2		*

(continues)

V. = version #. **Req.** = min. RAM and system software required.
★ = last time (in the past year) this or an earlier version reviewed.
NA = first version, not applicable.

$ = cost of update to registered owners.
* = contact your dealer for update policy.

Blue = new version.
Yellow = reviewed product.

PRODUCT	V.	REQ.	★	$
INSIGHT EXPERT	2.2	1MB/4.2		$99
GENERAL LEDGER				
INSPIRATION	3.0	1MB/4.2	12/91	*
INSTANT-EXPERT PLUS	2.0	1MB/5.0		FREE
INTOUCH	1.1	512KE/4.2	5/91	FREE
ITHINK	2.0	2MB/6.0.2		$149
JMP	2.0	2MB/4.2		$195
KALEIDAGRAPH	2.1	2MB/6.0.5	9/91	$20
KIWIENVELOPES	3.1	512KE/4.1		*
LABVIEW	2.1.1	4MB/6.0.5	10/91	*
LAPLINK MAC III	3.2	512K/2.0		FREE
LAPLINK MAC PLUS III	3.0	512K/2.0		*
LASERPAINT COLOR II	1.02	1MB/6.0.3		FREE
LETRASTUDIO	1.5	2MB/6.0		$45
LIGHT CHECKBOOK	2.0	1MB/6.0.3		*
ACCOUNTING				
LIGHTSPEED COLOR	2.5	1MB/6.0.5		*
LAYOUT SYSTEM				
MACANALYST	2.0	2MB/6.0		$125
MACARCHITRION	5.5	2MB/6.0.3		*
MACDRAFT	2.1	1MB/6.0.2		*
MACDRAW II	1.1	1MB/6.0		*
MACDRAW PRO	1.0	1MB/6.0.5	11/91	$99
MACENVELOPE	5.1	1MB/4.2		$29.95
MACENVELOPE PLUS	2.0	512KE/3.2		$50

PRODUCT	V.	REQ.	★	$
MACFLOW	3.5.4	1MB/6.0		$30
MACFORTRAN II	3.1	4MB/6.0.3		$99
MACLINKPLUS/PC	5.0	1MB/6.0.2		*
MACMONEY	3.5	512KE/4.0		$12
MACPAINT	2.0	512KE/3.2		$25
MACPHONEBOOK	3.0	1MB/6.0	9/91	*
MACPROJECT II	2.5	1MB/6.0		$99
MACRECORDER	2.03	512K/3.2		*
MACRENDERMAN	1.1	5MB/6.0.5	1/91	$75
MACROMIND DIRECTOR	3.0	2MB/6.0.5		$195
MACSCHEDULE	2.5	1MB/6.0		$30
MACSCHEDULE PLUS	1.0.5	1MB/6.0		FREE
MACSPIN	3.01	512K/4.3		*
MACTERMINAL	3.0	512K/3.2		$65
MACTOOLS DELUXE	1.2	1MB/6.0	1/91	*
MACTOPS	3.1	1MB/6.0.5		*
MACWRITE II	1.1	1MB/6.0		FREE
MANAGING YOUR MONEY	4.0	1MB/6.0.3		*
MANAPRO GENERAL	3.1	1MB/6.0		NA
LEDGER				
MAPGRAFIX	2.1.1	4MB/6.0.3		*
MARCOPOLO	1.1	1MB/6.0		FREE
MARKET MASTER	3.0	1MB/6.0.3		$95
MARKUP	1.03	1MB/6.0		FREE
MASTERFINDER	1.1	1MB/6.0.5	6/91	*

PRODUCT	V.	REQ.	★	$
MASTERPLAN	1.03	512K/6.0.5		FREE
MASTER TRACKS PRO	4.52	1MB/6.0.2		*
MATHCAD	2.06	1MB/6.0.2		FREE
MATHEMATICA	2.0	1MB/6.0		*
MATHTYPE	2.1.1	512K/6.0.2		*
MATHWRITER	2.0	2MB/6.0.5		*
MEDIATRACKS	1.01	1MB/6.0.2	1/91	FREE
METAMORPHOSIS	2.02	1MB/6.0.3		*
PROFESSIONAL				
META PRO	2.03	1MB/6.0		*
MICHAEL'S DRAW	1.0	1MB/6.0.5	12/91	NA
MICROPHONE II	3.0	512K/4.2		*
MICRO PLANNER MANAGER	1.0	1.5MB/4.0		*
MICROSOFT EXCEL	3.0	1MB/6.0.2	9/91	*
MICROSOFT FILE	2.0	512K/3.2		*
MICROSOFT MAIL	3.0	1MB/6.0.2	8/91	*
THE MICROSOFT OFFICE	1.5	1MB/6.0.2		$129
MICROSOFT POWERPOINT	2.01	1MB/6.0		FREE
MICROSOFT PROJECT	1.1	1MB/6.0.4	11/91	NA
MICROSOFT WORD	4.0	512KE/3.2		*
MICROSOFT WORKS	2.0	512K/6.0		*
MINDLINK	2.0	1MB/6.0		*
MINDWRITE	2.1	512KE/4.2		*
MINICAD+	3.1	1MB/6.0	7/91	*
MOCKPACKAGE PLUS UTILITIES	4.4	512KE/3.2		$15

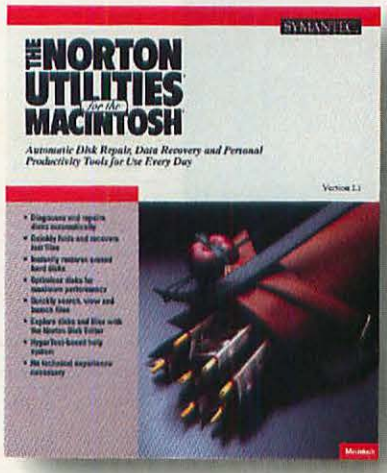
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USE IT.

If you want to protect the files on your hard disk, use Symantec's Norton Utilities® for the Macintosh,® the easiest and most powerful data repair and recovery program you can buy.

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The program offers a superbly integrated set of utilities and desk accessories. For starters, the Norton Disk Doctor®—which provides System 7 users with drag-and-drop simplicity—is the only Macintosh utility that diagnoses *and* repairs the 45 most common types of disk problems.



Our exclusive UnErase® utility finds and retrieves trashed or

"When it comes to rescuing a crashed disk, Norton Utilities is the best."
—MacUser Magazine, 3/91

19 90 WINNER MacUser

MACWORLD World Class Award Winner

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PRODUCT	V.	REQ.	★	$
MODELSHOP II	1.1	1MB/6.0.2		FREE
MORE	3.1	1MB/4.1		*
MULTI-AD CREATOR	2.0	2MB/6.0.3		*
MULTICLIP	2.1.7	512K/6.0.2		*
MULTILEDGER	1.1	512K/3.2		$75
MUSICPROSE	2.1	1MB/6.0		FREE
MUSIC PUBLISHER	2.5.2	1MB/6.0	12/91	$15
MYADVANCEDMAILLIST	3.0	512K/4.1		*
MYDISKLABELER III	3.0.4	1MB/6.0		*
M.Y.O.B.	2.0	1MB/6.0	10/91	*
MYTIMEMANAGER	3.5	1MB/6.0.3	11/91	*
NETMINDER ETHERNET	1.2	2MB/6.0		*
NETWORK BUNDLE FOR THE MAC	3.0	512K/3.2		*
NETWORK SUPERVISOR	2.0	2.5MB/6.0.3		*
NISUS	3.05	1MB/6.0.2	2/91	*
THE NORTON UTILITIES FOR THE MACINTOSH	1.1	1MB/4.2	2/91	$19
NOW UTILITIES	3.0	1MB/6.0.4	7/91	$29
NUBASE FOR THE MAC	1.3	1MB/4.1		$75
OCTAVO TYPECHART	1.5	1MB/6.0.4	7/91	FREE
OMNIPAGE	3.0	4MB/6.0		$25
OMNIS 5	1.2	1MB/6.0		*
ONCUE	1.3	512K/4.2		$10
ON LOCATION	2.0	1MB/6.0.5		$25

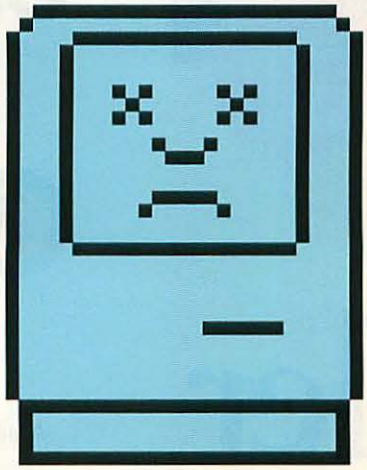
PRODUCT	V.	REQ.	★	$
ON SCHEDULE	2.0	1MB/3.0		*
OPEN PLAN/MAC	3.3	4MB/6.0		*
PANORAMA	1.5	1MB/4.2		$29.95
PAYROLL	4.0	2MB/6.0.5		$89
PERFORMER	3.61	2MB/6.0.2		*
PERSONAL PRESS	1.01	1MB/6.0.2		FREE
PHONENET LIAISON	3.0	1MB/4.2		$75
PHOTOMAC	1.5	2MB/6.0.3		$75
THE PHRASE THESAURUS	2.0	1MB/6.0	1/91	FREE
PICT DETECTIVE	2.0	512KE/6.0		$20
PICTUREPRESS	2.0	2MB/6.0.4		*
PIXELPAINT	2.1	2MB/4.1		*
PIXELPAINT PRO	2.01	4MB/6.0.5	9/91	$125
PLAINS & SIMPLE	1.06	1MB/3.2		*
PLANISOFT	1.3	512K/4.2		$49
POWERDRAW	3.0	1MB/6.0		*
POWERSTATION	2.5.5	512K/4.1		*
PRACTICA MUSICA	2.2	512K/3.2		*
PRESENTER PROFESSIONAL	1.0	5MB/6.0.5		NA
PRO-CITE	1.3.4	512K/4.1		*
PRODIGY	3.1	1MB/6.0		FREE
PROFESSIONAL COMPOSER	2.3	1MB/6.0.3		FREE
PROGRAPH	2.5	2MB/6.0		$49.99
PROPSFORMS	2.0	1MB/6.0.3		FREE
PROTOTYPER	3.0	1MB/4.1		$99

PRODUCT	V.	REQ.	★	$
PUBLISH IT	1.2	512KE/5.0		*
PUBLISH IT EASY	2.0	1MB/6.0		*
PYRO	4.0	512K/4.1		$15
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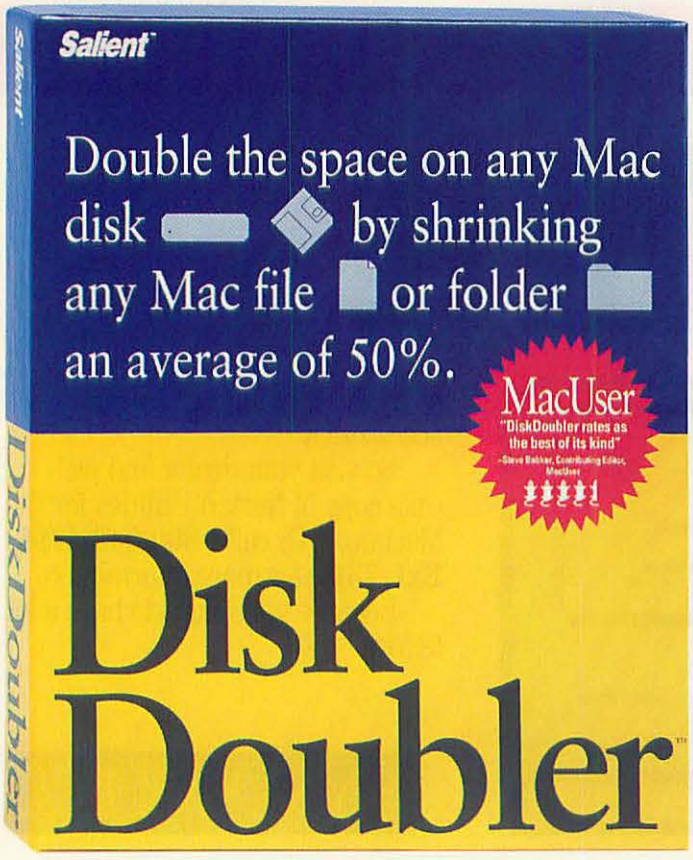
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How to Master 20 Popular Macintosh Programs Without Ever Reading The Manuals

Macintosh Programs Can Be Learned in a Few Hours With the Right Training

Over the past four years I've been associated with over 50,000 people attempting to learn the Macintosh computer. I've watched as each person wages their own personal, private battle to master the computer and the most popular Macintosh programs.

I've seen their frustration, have empathized with their confusion, and understood their computer fears. I've talked to workers who have had new computers and new programs simply dropped on their desk with the directive to, "learn this." I've listened to people who have struggled night after night trying to read and understand a computer manual. Can you imagine trying to understand and master 4th Dimension from the manual?

You would be surprised at the number of people who have confided with me the fact that they've given up trying to learn some of the programs. They put the box on the shelf and write the expenditure off as a bad investment.

Hard Earned Money Wasted

Can you imagine how much money has been wasted on programs and computers that are sitting abandoned? Right now think of the people working on Macs in your office. Do they really understand the computer? Do they know what to do when it goes down? How many programs are each of your people using? Have they really mastered the programs they're using? Do they know the short-cuts and valuable techniques that will save you time, money, and increase your professionalism?

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The Video Answer

Two years ago we introduced the MacAcademy Video Training Library. This library now includes over 45 different titles. Each video is 2 hours long and offers clear, concise, effective training for the Macintosh and over 20 popular programs. In many cases you can purchase up to 6 hours of training for one program.

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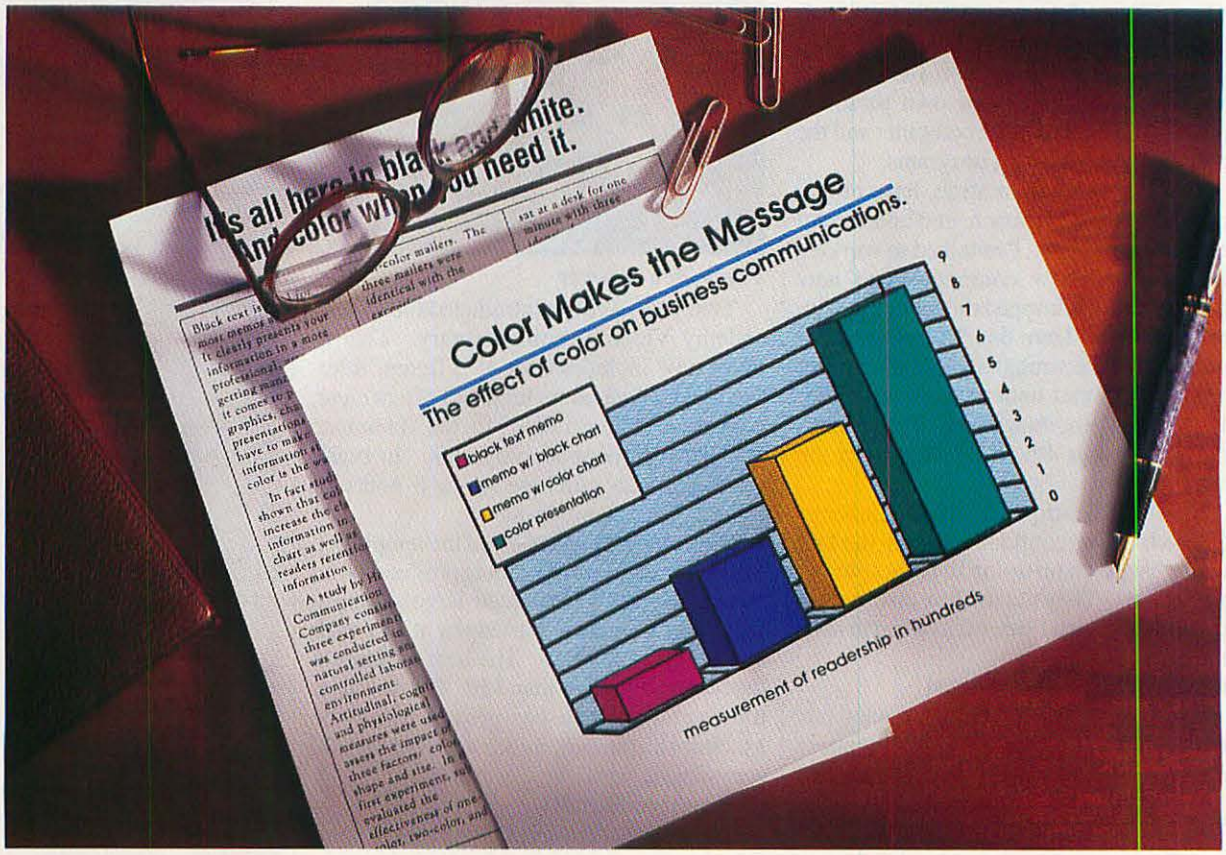
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What's the business world coming to?



Now, more Macintosh users can get their hands on some color. Without giving up great black and white. Hewlett-Packard makes it all possible with the new HP DeskWriter C printer. Impressive black and white. And thousands of colors. For just $1,095.*

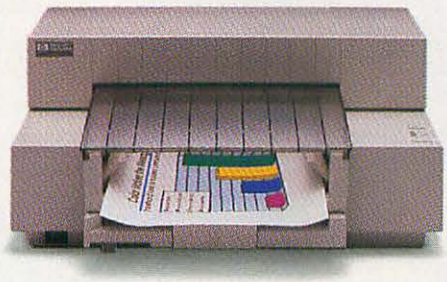
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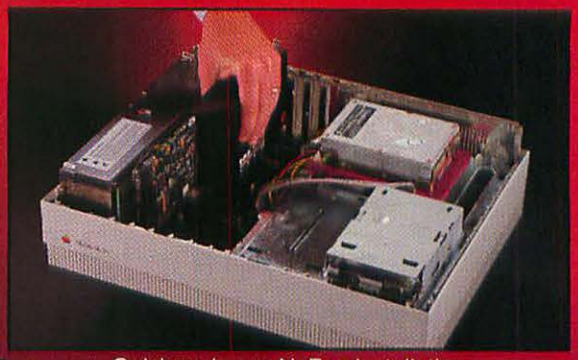
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Circle 52 on reader service card

Verbatim

An interview with Ian Diery, president of Apple Pacific

BY JERRY BORRELL

Ian Diery has worked in the computer industry for more than 13 years, spending 11 years at Wang Laboratories, most recently as an executive vice president, before joining Apple Computer in 1989 as senior vice president and president of Apple Pacific.

As the head of Apple's Pacific operating unit, Diery oversees Apple sales in Canada, Japan, Australia, New Zealand, India, and other countries in the Far East and Latin America. He had the foresight to prepare for the low profit margins of the Mac Classic; through attrition and cost control, he spared Apple Pacific (now down to about 900 employees) from the worst of 1991's massive layoffs. The division contributes nearly $1 billion to Apple's annual revenues; Diery predicts revenues of $2 billion by 1995.

A native of Australia, Diery is unusual among Apple's executives in his openness, accessibility, and candor. Neither time nor the industry have eroded his enthusiasm for computing.

MW What was the situation at Apple Pacific when you became president?

Diery Gross margins were beginning to decline, and I was convinced that that was important. If you milk your market for high gross margins, in a time of declining markets, your company will go into decline. We had a great deal of the high end of the PC market, so we expanded the product line to spread the base of our customers at the low end.

I felt that we had to decrease fixed expenses and put dollars into discretionary funds—we laid off staff in Australia, Canada, and Pacific headquarters and decreased our fixed costs as a percentage of revenues and increased our spending on sales and marketing. The result in the nine months of fiscal '91 was that revenues were up 47 percent over the same period two years ago. Employees had declined by 5 percent, and our productivity had increased by 50 to 60 percent as measured by revenue per employee—good results. We trimmed over a two-year period.

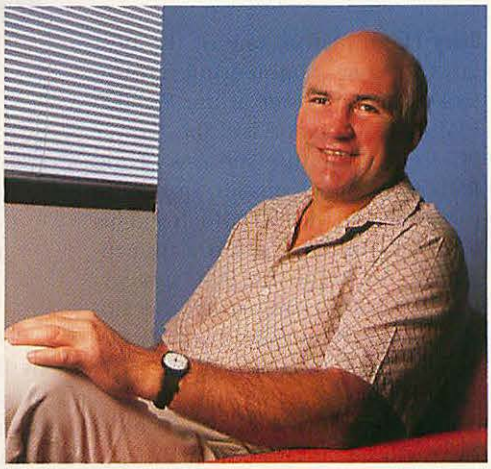
MW Was that easier than what the rest of the company went through in five months?

Diery Comparisons are odious. Let's compare it to losing weight over two years instead of over five minutes.

MW What is your interpretation of the Apple-IBM deal?

Diery Applications drive the industry. Word processors and spreadsheets were important application developments. Tough business decisions that once took a month to make take a week with computers. That drove the industry. Desktop publishing was the last important application development. . . . Most people agree that object-oriented programming [OOP] will drive new applications development. Together, Apple and IBM are better able to influence OOP and new applications.

Look overall at our industry compared with, say, the auto industry. Ten years ago an auto cost $10,000. Today it costs $25,000. Ten years ago a mainframe cost $100,000 and today that power is available for only $5000. We need breakthrough applications to increase the size of the marketplace to make up the profit we lose because the cost per unit is lower. We have to sell more computers. We need object-based systems to build the new applications that will return the dollars that we invest to build the customer base.



PHOTOGRAPHS BY ANDY FREEBERG

There is still tremendous growth. The information processing industry is [valued at] about $300 billion. What similarly sized industry grows 10 percent or more per year like our industry? Maybe the oil industry in

(continues)

times of crisis. So Apple has to take market share from others. And we have to grow the market. We have to increase our efficiency of dollars per employee.

There are five key things that we will accomplish with IBM that will help Apple do this. First is to obtain RISC [reduced instruction set computer] technology [for new computers]. Second is to develop object-based systems so that we can build the size of the market with new applications. Third is our server strategy. Fourth is multimedia. Fifth is obtaining the business of large business accounts, which still do not make up enough of Apple's market share. Working with IBM will give us a strategic opportunity. MIS departments will breathe a sigh of relief because the acquisition of Macs will complement their networks.

MW It is beginning to become clear in the aftermath of the Apple-IBM announcement that the failure in performance of Motorola's RISC architecture was one factor that drove IBM and Apple together.

Diery Hugh Martin, one of the best guys in our engineering group, looked at the power in the RS/6000 IBM RISC processor, and the "Power PC" concept [future versions of the RS/6000] that is smaller and more powerful than the 6000. Hugh and his team believe that there is a tremendous future in the IBM RISC strategy. I cannot really comment on the Motorola chip technology; it's really not in my area of expertise.

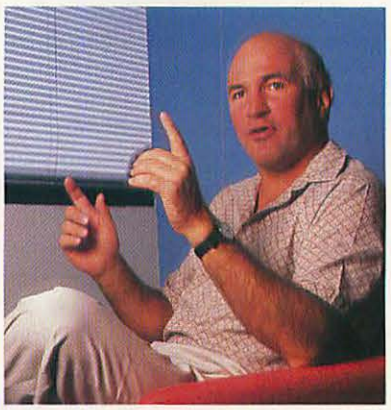
The fact remains that Apple's team believes that IBM also receives strategic advantages from having Apple use the chip, such as help in getting Unix to run under the Mac toolbox. Those things and all other aspects of the relationship made sense. In terms of criticism for using an IBM chip, for us the question was which chip was the best to get the Mac up to speed to compete with IBM. We did not want an also-ran chip.

MW How can you compete with IBM using technology that IBM will always know more about?

Diery If anyone can compete we can. IBM has leadership [with its RISC technology]. They want it to become an industry standard, and we're the biggest possible customer of such a chip.

MW How do you rank the markets in the Pacific region?

Diery In terms of revenues and installed base, Japan, Canada, Australia, the Far East, and Latin America. Brazil does not account for much, but Mexico is a big market. Latin America grew 53 percent last quarter driven



Apple believes that IBM also receives strategic advantages from having Apple use the RISC chip

by the boom in Mexico. Since the Mexican market has opened up we have gained 3 to 8 percent of the market share, depending upon who counts.

MW What's next in your expansion plans?

Diery Our Hong Kong subsidiary has been operational since 1985, and our Singapore and Taiwan subsidiaries began operating in 1990. We're not considering any new subsidiaries at this time, but there is a boom in Korea. We just signed up a new distributor in India, and Malaysia is doing well.

MW What about growth in Latin America?

Diery The potential is huge. Mexico alone is a huge market. If Brazil's president, Fernando Collor, lives up to his election platform, the 150 million people in that country present enormous possibilities in what is now a closed market. There are now more CPUs sold in Mexico, with 89 million people, than in all of Brazil.

MW Apple now has nearly 20 distribution sites in mainland China, and the company seems to be prospering. Your opinion?

Diery It's a huge market, a graphics-oriented market like Japan. We have an Apple Center in Beijing. Still, there are issues to address, like licensing and currency exchange. But we're poised to do well.

MW What are Apple's plans for manufacturing or product development in the Far East?

Diery We are considering an enlargement of our Singapore plant. We are working to source products from other sites [in Asia]—for example, for printed circuit board production in cases where the volumes are low and it makes sense to allow others to build these smaller-unit quantities. In fact, doing this helps us meet requirements of the Canadian and Australian governments.

MW What about Japan?

Diery It has become a great growth market. We probably have a 5 percent market share and could overtake IBM, which has 6 percent, soon. It is a huge success. The Japanese have embraced the Macintosh. Distribution in Japan is tough, but we have good distributors: Canon, Marubeni, and Kanto Denshi, among others. And we have done a good job of developing products. We had fewer than 50 software packages 18 months ago; there are about 300 now, including HyperCard stacks, fonts, and utilities. [Some 85 percent are from U.S. developers.] That is extraordinary. By 1995 we want

(continues)

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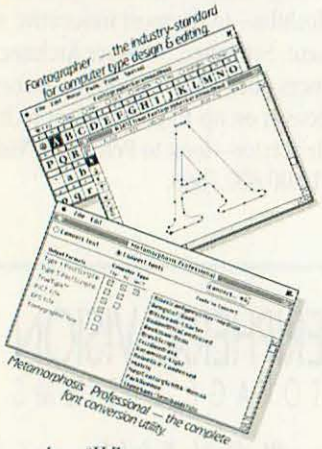
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10 percent of the market, and over 1000 [Japanese] applications.

MW You predict $1 billion revenues from Japan by 1995. Where will Japanese sales be in 2000 for Apple?

Diery I haven't made projections about that yet; there are too many ifs and buts, and the whole IBM-Apple [joint venture] may impact that. But I can respond in this way. I believe that we have to have a 15 percent market share in every market where we are if we're to be a viable competitor in the long run.

MW How do you explain the company's success in Japan? For years the company bumbled efforts there.

Diery First, there is the product: we introduced a kanji-based product. Second, we have a good management team—we didn't lose the flavor of a U.S. computer company doing business in Japan. Third, there is a good infrastructure of developers, seminars, and magazines. Fourth is the strong distribution channel. Fifth, we have many applications.

Also we shouldn't underestimate the value of Japanese being a picture-based language. The Macintosh is fundamentally the same. These days you see the Mac everywhere in Japan as a hot product—on TV shows, in stores.

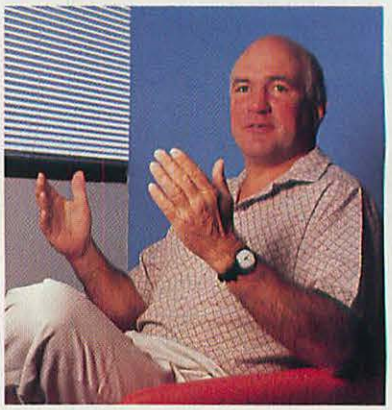
Others have kanji-based products. Windows is out now in Japan, which will boost the PC market. But we positioned our product in areas like industrial design, education—areas where the distribution channel benefits from integrating systems.

MW Apple's use of Japanese-produced LCDs in the new PowerBooks has caused quite a problem for Apple in light of the Federal Trade Commission's decision to slap Hosiden, the manufacturer, with a 63 percent duty. Will you be able to sell the PowerBook model with that display?

Diery I think Jim Burger, Apple director of government law, should answer that question. [According to Burger, Apple disagrees with the FTC decision and will be forced to manufacture the active matrix model in either its Singapore or Cork, Ireland, manufacturing facility. "It's a crazy decision—how it protects American industry is beyond me," Burger said.]

MW One of the industry's worst-kept secrets is that the PowerBooks are manufactured by Sony. Why is this fact a secret anyway?

Diery Let me talk about that question in another way, whether we in Apple should develop and build everything, for example, in a market like Japan where NEC leads and drives the mar-



ATM will be incorporated into a new version of System 7. What does that mean for TrueType?

ket. In Japan it makes sense to market a computer with a floppy drive that can read disks formatted for NEC drives. And there are other issues of appropriateness for certain markets, like weight. Five or six pounds is a lot for a portable computer to weigh in the Japanese market.

So there are arguments for development of unique products in Japan. Also, it's good for us to focus on the operating system and to allow Japan to focus on form and factor. It helps us worldwide. There are lots of pluses.

MW After months of saying that Apple would release its 21-inch color moni-

(continues)

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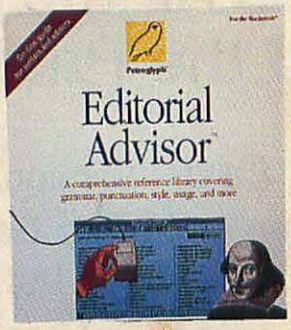
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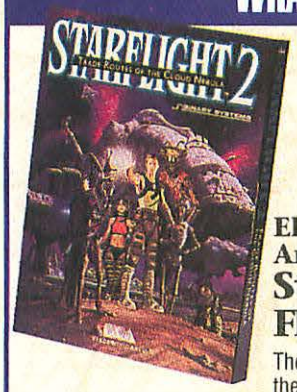
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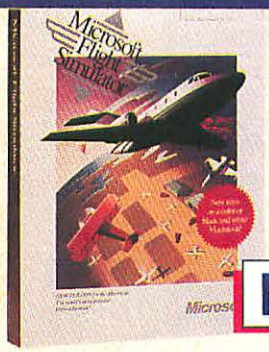


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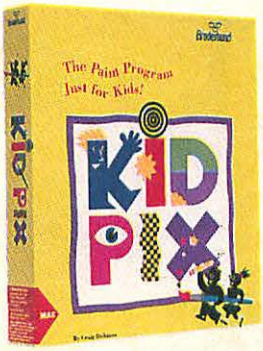
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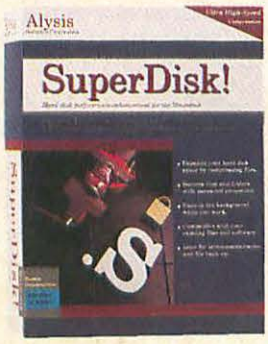
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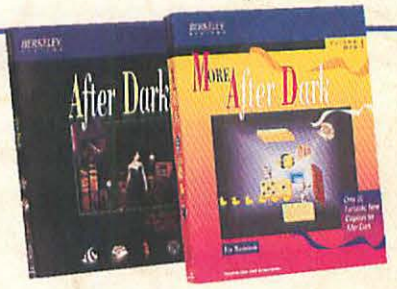
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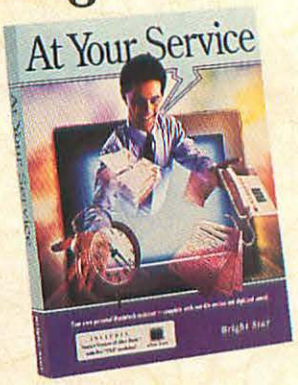
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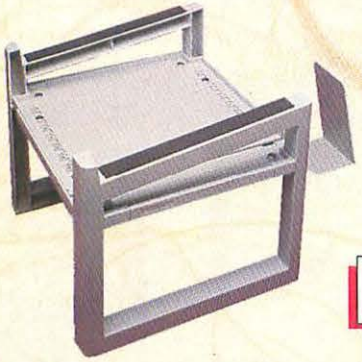


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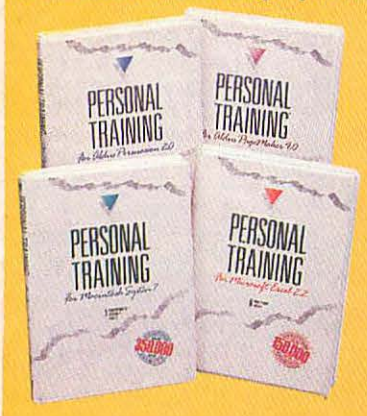
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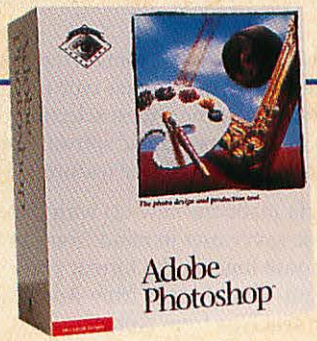
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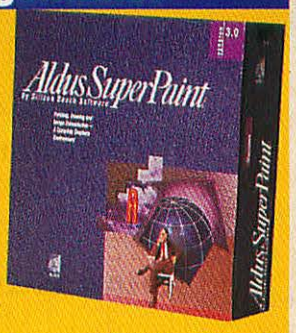


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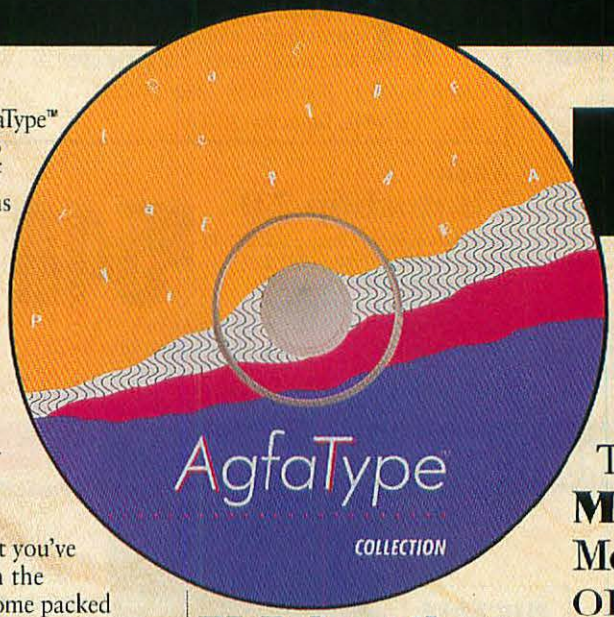
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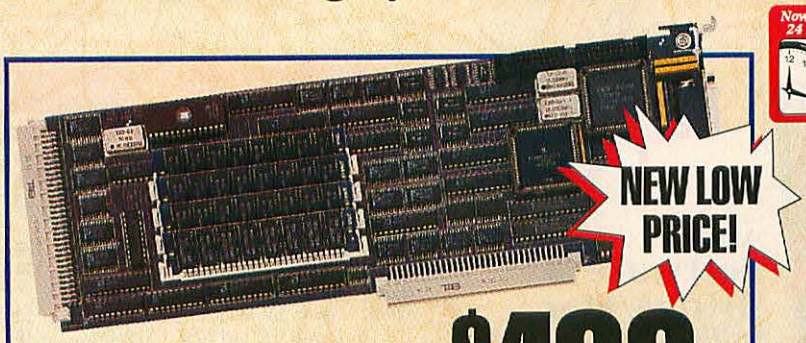
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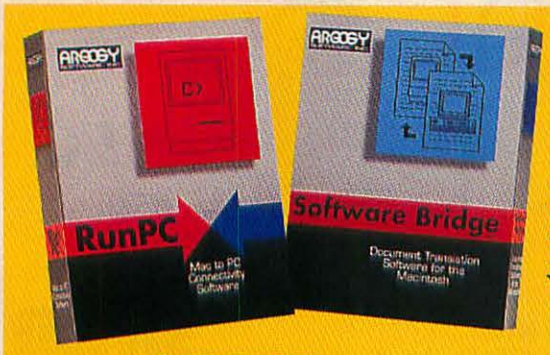
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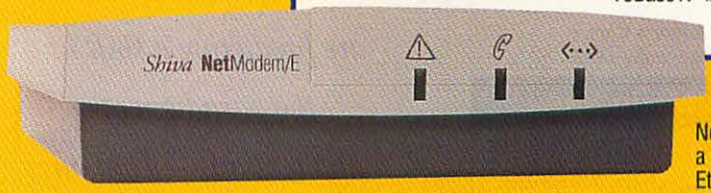
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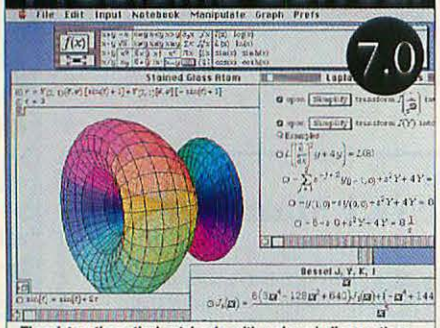
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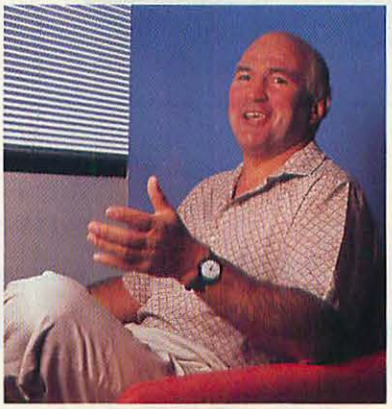


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tor only in Pacific and European markets, Apple recently decided to release the product in the United States, much to the chagrin of U.S. third-party developers. What happened?

Diery I'm a firm believer in what I call the Apple federation: Apple, its third-party developers, resellers, consultants, distributors—that are so important to Apple's markets. I personally visited with third-party developers during our decision making about this. There were lots of factors in the decision. But the biggest factor was that I found that there was not sufficient distribution in the Apple Pacific region.



People at Apple are predicting a shift in the paradigm of applications—what an application is and how a user sees it

Even the biggest company, Radius, did not have sufficient coverage. And we're a global company. I discussed this with the head of Radius, Mike Boich, and he said he understood. This is actually Bob Puette's area, not mine. So I really can't comment on the Apple USA decision.

MW Apple has announced it will incorporate Adobe's ATM technology into a new version of System 7. What does that mean about TrueType?

Diery We are not giving up on TrueType, but we did learn an important lesson about going it alone. PostScript is a great standard. We should be incorporating both PostScript and TrueType into our products to help our customers. I always look at products from the customer point of view, and customers want a choice.

MW Many people in the company see the adoption of ATM and PostScript as a defeat for the five years of development that went into TrueType.

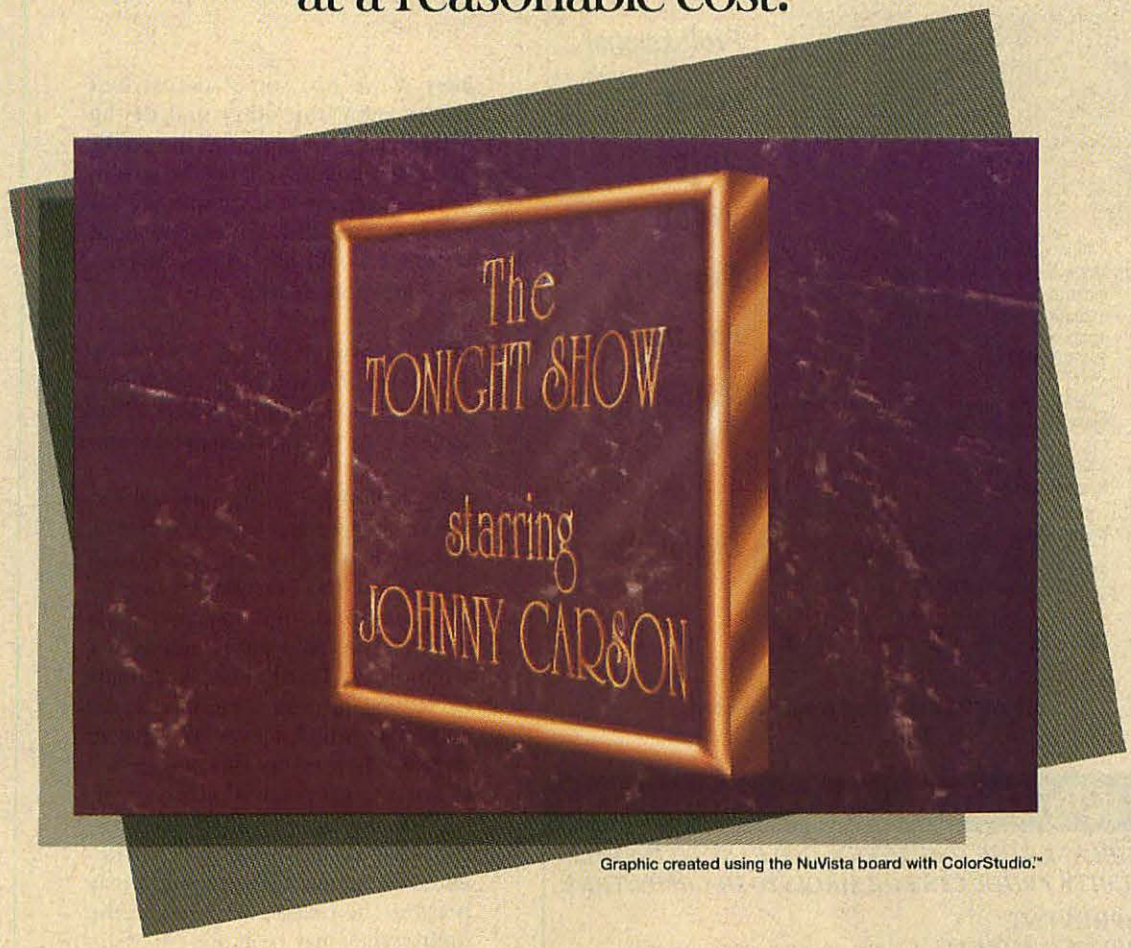
Diery I don't see it that way. In the old days I would have agreed with you. We used to have winners and losers at Apple all of the time when we had a charismatic style of leadership, but we can't do that anymore. We need to be able to discuss the decisions we make. John Sculley and Mike Spindler allow discussion without fear. There is now room for healthy debate at Apple. I think ATM is a healthy addition for our font standard.

MW Apple's new Quadra product line ostensibly takes the company into the workstation market [see "Macintosh Quadras: Power but No Pizzazz" in this issue]. But many people are unimpressed by the 68040-based Quadras, particularly in light of announcements such as Silicon Graphics' new Indigo workstation, which dramatically outperforms the Quadra and whose pricing begins at $8000.

Diery We are seeing the merging of the workstation and the PC markets, a blurring of applications between the two markets. The high end of PCs are moving to graphics, the low end of workstations are moving to business. There is room for both. An engineering manager wants to see files from development engineers produced on a high-performance workstation, and take them and put them into a memo that is developed on a Mac. The market for PCs with an ability to see 3-D is larger than the application market for high-performance workstations for engineers. But applications will have offerings in both worlds. Silicon Graphics and Apple both have room to compete. The market will be hotly contested.

(continues)

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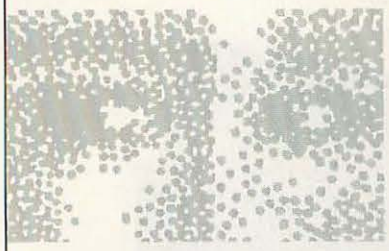
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MW After years of investment by Apple, computer-aided design has never come to fruition as a vertical application market on the Mac. Why not?

Diery We've had some success, but you're right, the other end of the market has done better. As the power of the Mac builds, we'll see the growth of development in CAD software for the Mac. Overall we're not doing as well as I would like in that market; we need more success in CAD.

MW John Sculley formed two new divisions of the company, consumer products and enterprise-wide systems. Can you say what their mandates are?

Diery Well, these groups are still formative, but we can say some things. We need to go back to the discussion about the changing nature of the computer industry, which is driven by specialized applications, not technology. Technology is actually decreasing the price of products to the consumer, which means we have to increase the number of units we sell in order to gain more dollars overall.

The consumer group's products, especially as they relate to object-oriented programming technology, may not even be called computers in the future. They may be home-entertainment centers. That is where the growth of the future lies, in the consumer [arena], not in computers. There are smaller but innovative markets we'll address, but [for now] we've got to increase the addressable market for our technology.

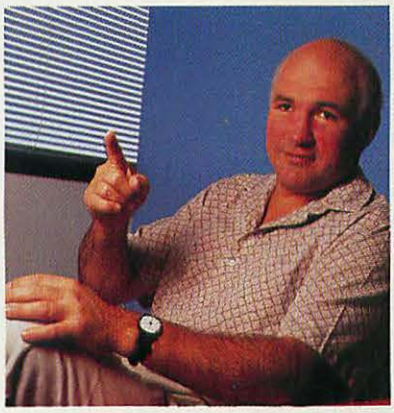
MW What can you tell us about enterprise-wide systems?

Diery To understand enterprise-wide systems, you need to look at the PC market, which is traditionally hardware. International Data Corporation says that two thirds of all desks in companies have computers. There is a wealth of technology in the corporate world in traditional areas: hosts, networks, desktop computers. The customers demand that we integrate products into a corporate network, that we provide security, an audit trail, and allow users to get at central

corporate data files that reside on mainframes.

If Apple wants to gain momentum, we have to allow all corporate computer users to take advantage of the Macintosh. We have to take part in the host-environment market. The enterprise-wide systems division is not just product, but methodology as well.

MW People at Apple are predicting a shift in the paradigm of software applications—what an application is and how a user looks at it or treats it. Many software developers are worried about what the future may hold.



This industry changes at 100 miles per hour . . . . If we don't plan for change, we go away.

Diery Indeed. This industry changes at 100 miles per hour. Mainframes, minis, laptops. If we don't change, we go away. Third-party developers, if they don't plan for change, will go away too. But a lot of developers are already thinking about this. We see this in the reseller channel too. They are sensing a change and taking heed of future competition.

We can't stand still or the price of technology will take us over. How many minicomputer companies made the shift to the desktop over the last few years? Technology is cheaper and more powerful. In the standard market there are decreasing revenues. We either increase our market share or go away.

MW What are the primary trends that you see?

Diery I see more information being delivered to the desktop. The ability for users to create new applications. The ability to ask computers questions that we need answers to. The integration of voice. Multimedia. Customized, personalized computer applications.

MW Can nice guys survive in this business?

Diery It's a tough business; change is so quick. Think about it. That's been true for each generation; our parents' generation changed faster than our grandparents'. People underestimate the speed of change. Not only do you have to be good to survive but you have to change fast.

The notebook market is an example. A lot of groups have not grasped that the business model behind notebooks has changed the business. You have to make more revenue per employee to survive in that market.

MW Can nice guys survive at Apple?

Diery Gee. Mike Spindler and John Sculley are more objective in their evaluation of people; people who perform will survive at Apple. Spindler and Sculley have brought a lot of management process to Apple. Mike Spindler implemented succession planning throughout Apple. Now the entire company works from the same plan. People have clear ideas of the goals they need to accomplish to achieve what they want.

We did this a while ago in the Pacific group because I believe in three things in human-resource management: setting goals and objectives, reviewing objectives, and succession planning. I hold these things dear, and over the last two years we have put them into place within the Pacific Region.

But to return to your question, I don't know if nice people will survive, but competent people will. M



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Min. requirements: Mac Plus or higher with 1 meg RAM, System 6.0.4 or later.

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MACWORLD NEWS

by Dan Littman and Tom Moran

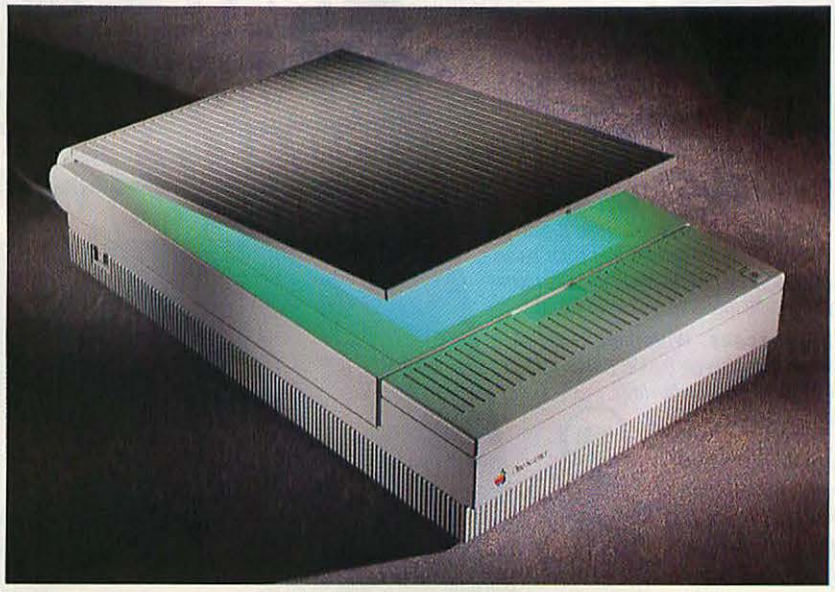
OneScanner We Can Afford

Apple's new PhotoGrade technology enables its LaserWriter IIf and IIg printers to produce the best-looking halftones you will see from a 300-dots-per-inch laser printer (see "High-Performance Printing," in this issue). But output is only half of the gray-scale quality equation. By introducing the new OneScanner gray-scale scanner in October, Apple addressed the other half.

The OneScanner is a long-overdue overhaul of the Apple Scanner, whose 4-bit design was able to recognize only 16 levels of gray. The OneScanner, like most of today's gray-scale scanners, is an 8-bit machine capable of discerning 256 gray levels. That ability means better image quality and fewer jarring transitions between gray levels.

The OneScanner uses the identical case as the now-discontinued Apple Scanner, but its internals are completely redesigned. According to Apple, the OneScanner works up to three times faster than the Apple Scanner. The OneScanner responds to the same software commands as its predecessor does; optical character recognition programs and other software written to work with the Apple Scanner will work with the OneScanner, unless they look for the Apple Scanner by name.

For controlling the OneScanner, Apple includes an easy-to-use image-acquisition program called Ofoto. Ofoto features a built-in gray-scale calibration scheme that enables you to fine-tune the program to deliver the best results with your printer and printing process. You can create as many calibration sets as you like, and switch between them using a pop-up menu. A bevy of automatic scaling, rotation, and cropping options allow scanning novices to get high-quality results without calculating scaling factors or grappling with image processing programs. Advanced users can also fine-tune details such as highlight and shadow dot values. Ofoto provides basic brightness and contrast controls and pencil and eraser tools, but lacks the gamma-correction features and the well-stocked retouching toolbox of an image processing program.



MARK JOHANN

The Apple OneScanner comes with Ofoto image-acquisition software from Light Source, can discern 256 grays, and is up to three times faster than the previous Apple Scanner.

The OneScanner comes with HyperScan 2.0, an improved version of the stack that lets HyperCard users scan images directly into HyperCard. HyperScan 2.0 includes improved exposure adjustments, support for HyperCard 2.0's variable card sizes, and a tutorial that walks beginners through the scanning process.

What may be most exciting about the OneScanner is its $1399 price: $400 less than what the Apple Scanner cost, and $600 less than Hewlett-Packard's new ScanJet IIc. True, the latter supports color and scans at 400 dpi (versus the OneScanner's 300 dpi). But given the relative dearth of color printers and the fact that 300-dpi scans are more than adequate for getting high-quality halftones from even an imagesetter, chances are the OneScanner will meet most users' needs.—**Jim Heid**

Apple Offers Rebates

To boost sales during the end-of-year selling season, Apple Computer is offering substantial Macintosh rebates through January 5.

The rebates for Macs bought with other Apple products are

(continues)

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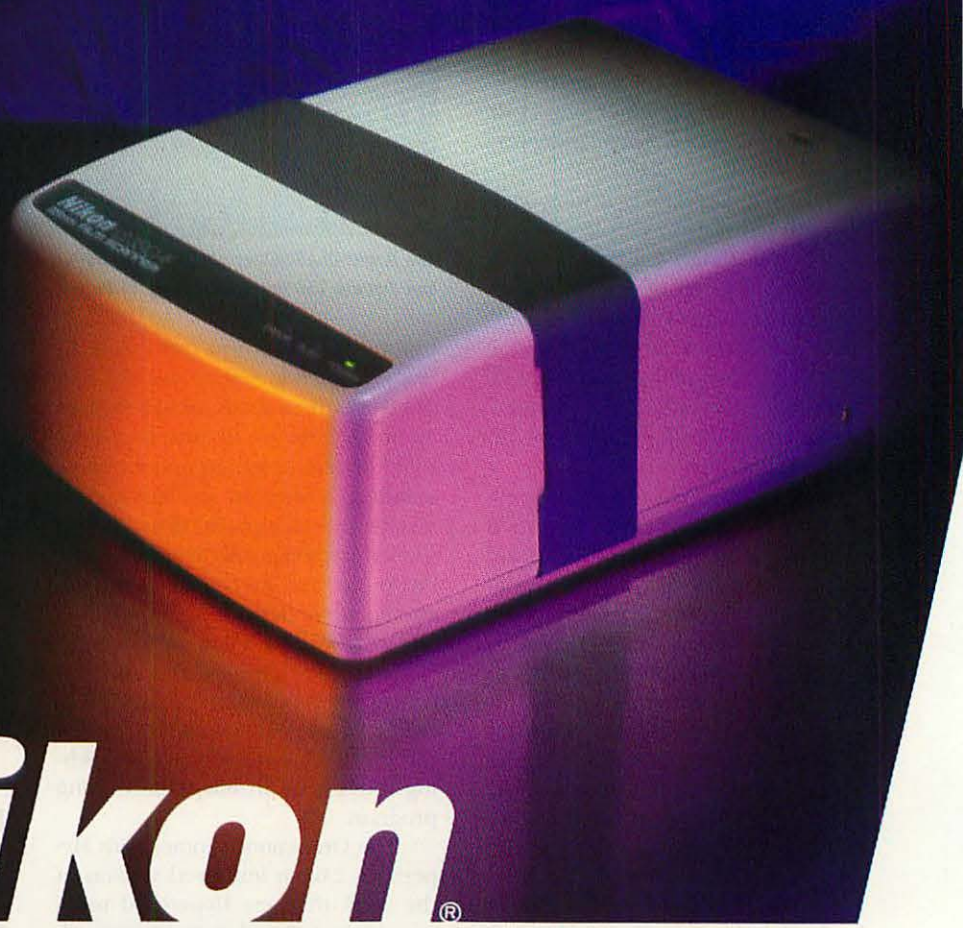
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- $800 on any Mac IIci



STEVEN BLOCH

Intended for Apple's PowerBooks or other portables, La Cie's 40MB PocketDrive uses a 2½-inch Quantum hard drive.

PocketDrive Gives Portable Storage

La Cie has introduced the PocketDrive, a very small and light 40MB hard drive that uses a 2½-inch Quantum mechanism. Intended for Apple's new PowerBook portables or other Macintosh systems, the PocketDrive weighs just under 10 ounces. It comes with several adapters that allow it to hook up to any Mac, 5MB of public domain software, and La Cie's Silverlining hard drive utility package.

The PocketDrive, which has a 19ms average access time, was slated to begin shipping in early October at an introductory list price of $449. An 80MB version of the PocketDrive is scheduled to ship in November at a list price of $599, including the same adapters and software. For more information, contact La Cie in Tualatin, Oregon, at 503/691-0771 or 800/999-0143.—**T.M.**



NASA

Jim Adamson floats in front of a window aboard the space shuttle Atlantis. Notice the Mac Portable behind him.

E-Mail in Space

"Hello, Earth! Greetings from the STS-43 crew. This is the first AppleLink from space. Having a GREAT time." On August 4, space shuttle astronauts on the Atlantis sent this message to the Mac-in-Space team at NASA. The astronauts went up on August 2 to deploy the fourth Tracking and Delay Relay Satellite (TDRS).

Their missive took a more complex route than would the everyday note sent on Apple's electronic messaging system: from the astronauts' Macintosh Portable to a commercial satellite; down to a receiving dish in White Sands, New Mexico; back up to a TDRS satellite; back down to a Macintosh Portable at the Johnson Space Center in Houston; and from there to AppleLink's central computers, which are run by General Electric in Brookpark, Ohio.

Besides sending mail and disk files via AppleLink, the astronauts succeeded in accomplishing several other Macintosh projects.

- Tracking the shuttle's flight path using MacSPOC (Spacecraft Personal Orbit Computations), an application that presents a real-time display of the shuttle's orbital position against a world map, along with day and night cycles, tracking stations, and emergency reentry information.
- Recording the results of medical experiments.
- Testing cursor-control devices (warning for zero-gravity travelers: the Mac Portable's built-in trackball has to be restrained or it floats away).

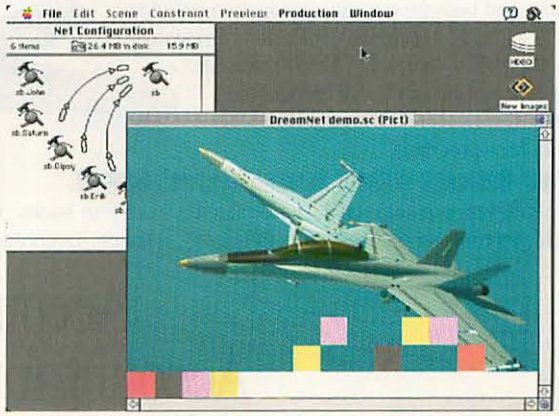
Byron Hahn, an Apple engineer who worked on the Mac's Communications Toolbox, says the AppleLink-to-space connection uses a module for the Communications Toolbox that he developed with James Beninghaus. Hahn says the new tool is not AppleLink-specific and would support space communication for any Comm Toolbox–compatible software.

—**Ann Garrison**

The Threads that Bind

Are your Macs bored? Would you like them to communicate on a higher level than that of the ordinary grunts and mumbles uttered while sharing a network? An operating system extension developed as an experiment at Apple makes it possible for Macs to split up their processing duties and keep themselves busy. The unnamed technology gives the Mac threaded communication, a big leap beyond the interapplication communication in

(continues)



Networked Macs each render patches of a Ray Dream image. Upper left window shows slaves' work assignments.

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Circle 367 on reader service card

System 7, or the Open Scripting Architecture under development (see *Macworld News,* November 1991).

Threading allows an application to work on multiple tasks simultaneously without getting confused; it also allows one application to ask another application to perform a task without grinding to a halt while waiting for the response.

The first demonstration of this experimental technology was at the August Siggraph. There Ray Dream used DreamNet—a special threading version of Ray Dream—to parcel out tasks to a network of slave Macs; each Mac was responsible for rendering a patch of a ray-traced image. Ray Dream president Eric Hautemont says DreamNet is about 95 percent efficient—that is, even with network and communication overhead, 10 Macs complete rendering an image in slightly more than 10 percent of the time it would take one Mac.

Michael Gough, senior engineer in Apple's User Programming group, which developed the threading technology and the master/slave Finder interface, says it is unlikely that Apple will allow third-party developers to use the technology commercially in its present form (Ray Dream plans to develop its own threading). Gough also points out that for an application to understand how to split up and reassemble a task is a very complex problem; most Mac applications would require redesigning from scratch to take advantage of threading. Ray Dream is in Mountain View, California, at 415/960-0768.—**D.L.**

The Portable Finder



New software from Apple lets you phone home for files. Prosaically named AppleTalk Remote Access, the new program can use modems to connect a Macintosh to a network over telephone lines as if it were plugged in with a LocalTalk connector. Once connected, the remote Macintosh has access to all network services such as electronic mail, printers, System 7 file sharing, and AppleShare servers. Remote Access, which requires System 7, comes with Apple's new portables (see "Macintosh PowerBooks: 100, 140, and 170," this issue), or you can buy it for $199 with a license to use the program on three computers.

While connected to a remote network, you have full access to your local network as well. For example, you could open a file from a remote file server and print it on a local printer. Although Remote Access lets one Mac connect to two AppleTalk networks at once, it does not act as a bridge between the two networks for other network users.

Remote Access has security features that include password protection and automatic callback. The program also keeps a log so you can see who has used (or tried to use) your network.

AppleTalk Remote Access employs some special techniques to speed throughput, including using the computer to compress and decompress data with the MNP standard; if your modem has MNP compression built in, Remote Access turns it off because it is faster to transfer already-compressed data through the serial port. Apple recommends 9600-bps modems for heavy use, but says that 2400-bps modems are adequate for occasional access.—**Lon Poole**



ACEY HARPER

The fish are definitely biting. Mitchell A. Roffer, oceanographer turned high-tech fisherman, on the docks in Miami.

Fishing by Satellite



Going fishing? Use your Mac. That's what Mitchell A. Roffer does. But these days Roffer is so busy finding fish for other people that he hardly has time to pick up a pole himself.

After ten years doing oceanographic research at the University of Miami for NASA and the National Oceanic and Atmospheric Administration, Roffer decided in 1987 to go out on his own and start a firm providing people with information about where to find fish. Now Roffer's company, Ocean Fishing Forecasting Service, *(continues)*

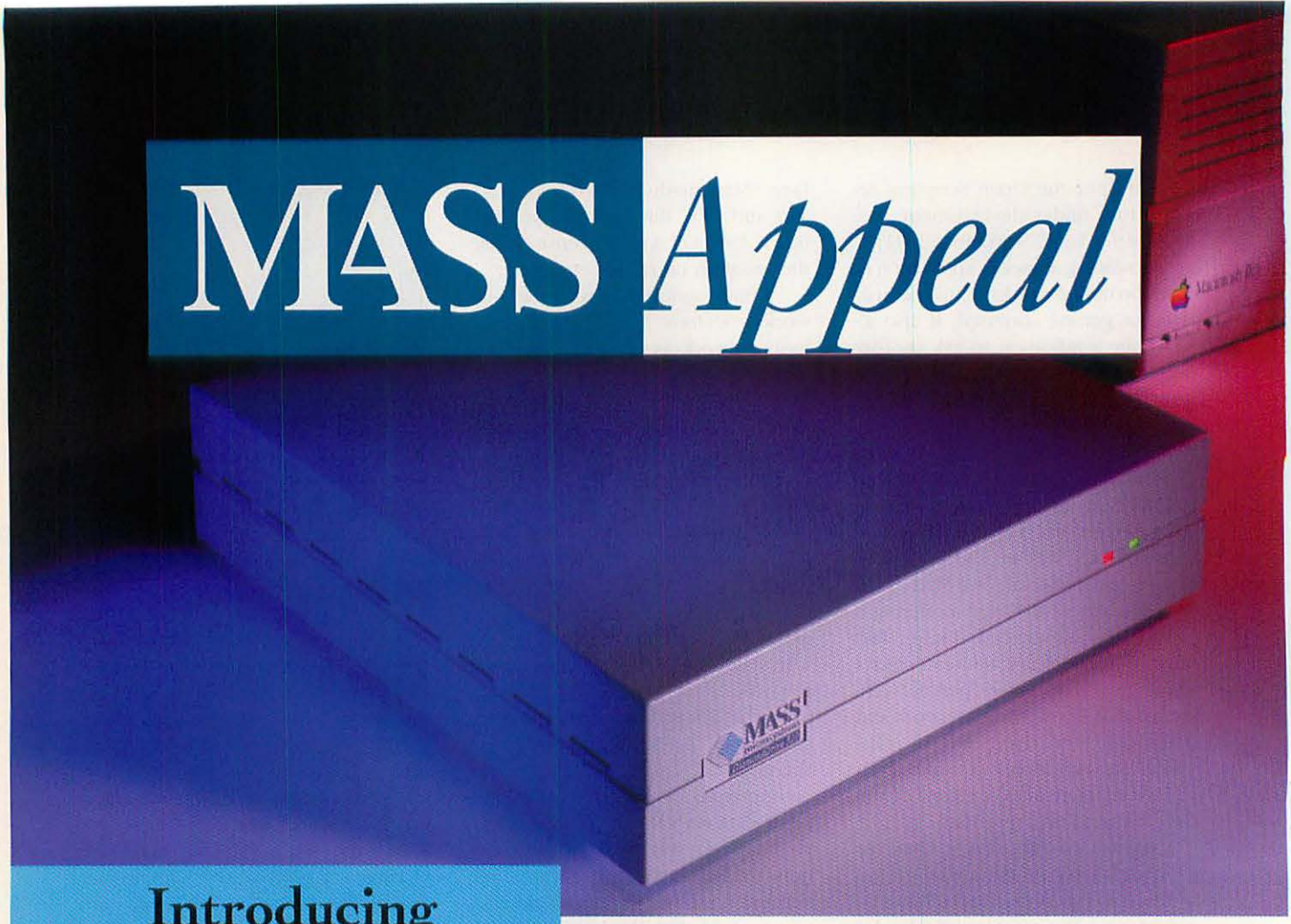


SOBRATO DEVELOPMENT

APPLE TO BUILD NEW R&D FACILITY

As part of Apple's restructuring, construction has begun on the Apple Research & Development Campus in Cupertino, near Apple headquarters. Expected to be ready in late 1993 at a cost of more than $200 million, the complex will include six buildings and 856,000 square feet of space.

MASS Appeal



Introducing DiamondDrive™

Now there's only one company you'll need to turn to for Macintosh® storage. **MASS Microsystems**™. And for affordable high-capacity, hard drives; now there's one drive just right for you. **DiamondDrive.** *It has MASS Appeal.*

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MASS Appeal also means quality, dependability, and support. A pioneer in award-winning Macintosh storage peripherals, MASS Microsystems' name is synonymous with quality. And as the first Macintosh-only public corporation, MASS Microsystems is a company you can count on. With a worldwide network of dealers and distributors, a 2-year warranty and toll-free technical support, we're there when you need us.

For a free demo disk, or the name of a dealer near you, call toll-free **800-522-7979.**

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MW12-DD

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Circle 207 on reader service card

enjoys an international reputation for fish-finding and environmental work.

Using a Mac II and a Mac Plus with off-the-shelf software such as MacSat from Newcastle Computer Services and SatView from Marysis, Roffer gathers signals from satellites—American, Russian, and Chinese—to collect information on ocean conditions. He enhances the images with Micro-Frontier's Enhance and the National Institute of Health's Image. By observing temperature and color patterns and using his extensive knowledge of fish biology, he predicts what types of fish may be found and where.

This service saves fuel for commercial vessels as well as sports-fishing enthusiasts. It also provides regulatory bodies with information that helps them manage the size of catches. For example, if abnormal ocean conditions are observed that may adversely affect spawning, a regulatory body can lower the capture limits for a species.

Roffer also provides his services for environmental habitat assessments. Pollutants, such as oil spills, can be tracked as they flow with ocean currents. Roffer's company is in Miami at 305/271-9229.—**Martin Rein**

Fax/Modem for Notebooks

Global Village Communication has introduced the TelePort/Lap and TelePort/Lap V.32, a pair of lightweight send/receive fax modems that fit into the internal modem slot included in all three of Apple's new PowerBook laptops. The TelePort/Lap's data modem runs at 2400 bits per second, its fax sends and accepts data at 9600 bps, and the TelePort/Lap includes the V.42bis data-compression algorithm. The TelePort/Lap V.32's modem and fax both run at 9600 bps, although with V.32 enabled, the modem's effective speed goes up to a maximum of 38,400 bps. The TelePort/Lap V.32 also comes with a small external interface module that can be changed for different international telephone standards.

Both fax modems were slated to ship in October. The TelePort/Lap will have a list price of $399, while the TelePort/Lap V.32 will list for $899. For more information, contact Global Village in Menlo Park, California, at 415/329-0700.—**T.M.**



ANNE NADLER

The Radius PowerView, a SCSI device, lets Apple's PowerBook 140 or 170 connect to a large-screen monitor.

Radius Licenses Apple Video Technology

Radius recently announced that it has licensed video technology from Apple. Radius will offer this technology in an inexpensive 24-bit NuBus board that accepts, converts, and outputs video signals while eliminating flicker on a monitor. The board, called Touchstone and expected to cost under $2000, may ship in the first quarter of 1992. The transfer of the technology, code-named Lexington inside Apple, is an example of Apple increasing its focus on developing systems and systems software and leaving more peripherals to third-party developers.

Radius also recently unveiled the PowerView, a SCSI device that connects to one of the new Apple PowerBook laptops to let the model 140 or model 170 drive a 12-inch or 13-inch Apple color monitor, or a VGA-compatible color monitor. Future software enhancements will support the Radius Pivot, Color Pivot, and Full Page Display. The list price for the 8-bit PowerView was not set at press time, but Radius projected it to be around $695. The company expected to begin shipping it before the end of the year.

Radius earlier announced the PrecisionColor 8X and PrecisionColor 24X, 8-bit and 24-bit NuBus graphics adapters, respectively. The accelerated boards differ from earlier Radius offerings because they are faster and are designed to support a wide range of monitors. Both should ship in October, the 8X at a tentative list price of $595 and the 24X tentatively at $1195. For more information, contact Radius in San Jose, California, at 408/434-1010.—**T.M.**

Lapis Ships Full-Page Display

Lapis Technologies, maker of display adapters used by many third-party vendors, has introduced its first display subsystem, a combination full-page display and adapter. The Lapis Full Page Display has a suggested retail price of $899, including the appropriate monochrome adapter for either the Plus, Classic, SE, SE/30, LC, IIsi, or one of the NuBus Macs. Lapis says it expects the street price of the monitor-adapter combination to be about $300 less than competing subsystems.

Like the Apple Portrait Display, the Lapis monitor has a resolution of 640 by 872 at 80 dpi, uses a paper-white phosphor, and has a refresh rate of 75Hz. The Lapis Full Page Display in-

(continues)

VIRUS WATCH

Current viruses, Trojan horses, and worms affecting the Macintosh community.

ZUC C

Type: Virus
First listed in Virus Watch: 10/91
Info: A ZUC clone.
Impact: Nondestructive; infects applications and system files; renders cursor inoperable.

HC

Type: Data Virus
First listed in Virus Watch: 6/91
Info: Infects HyperCard stacks.
Impact: Causes the Mac to hum oddly.

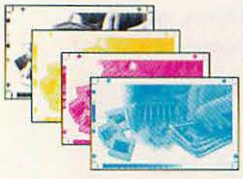
nCAM

Type: Virus
First listed in Virus Watch: 5/91
Info: An nVIR clone.
Impact: Nondestructive; infects applications and system files; can cause crashes.



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Microtek removes the biggest barrier to owning a Slide Scanner



If price has been the barrier separating you from high quality color scanning, take a look at the ScanMaker 1850.

Another stunning price breakthrough from Microtek, the leader in affordable color scanning solutions.

The ScanMaker 1850 sports a formidable set of specs. 35 x 35mm scanning area. 24-bit color. 8-bit gray-scale. 1850 dpi resolution.

Best of all, it's so easy to use. Just drop in any slide and you're ready to start scanning.

The ScanMaker 1850 gives you everything you need to go from comps to final color separations. It even comes bundled with PhotoStyler for the PC or Adobe Photoshop for the Mac.

But wait, it looks even better when you see the price. Just $2,995 for the ScanMaker 1850 on the PC. And only $3,195 for the Mac compatible ScanMaker 1850S.

24 bit Color 1850 DPI

Call 1-800-654-4160 or 213-321-2121 in California for the name of the Microtek authorized dealer nearest you.

Because the only barrier between you and a 35mm color scanner now is a toll-free phone call.



The ScanMaker 1850 is just one member of a whole family of affordable desktop peripherals available from Microtek.



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Circle 63 on reader service card



ANNE NADLER

The Lapis Full Page Display lists for $899 with an adapter board for the Plus, Classic, SE, SE/30, LC, IIsi, or a NuBus Mac.

cludes a tilt-and-swivel stand, and the brightness and image controls are on the front of the monitor. The display uses a tube made by Tripole of Korea.

Lapis has begun shipments of the Full Page Display. The device requires System 6.0.3 or later and Finder 6.1 or later. For more information, contact Lapis in Alameda, California, at 415/748-1600.—**T.M.**

Accelerator/Display for the Classic

Mobius Technologies has integrated an accelerator, a graphics adapter, and a full-page display for the Macintosh Classic. Called the 030 Display System, the product includes a 68030 accelerator that increases the Classic's performance by up to six times, according to Mobius. The accelerator and graphics-adapter boards snap onto the Classic's system board.

The monochrome monitor has a 75Hz refresh rate and a resolution of 78 dpi. The 030 Display System lists for $1145, including a tilt-and-swivel stand.

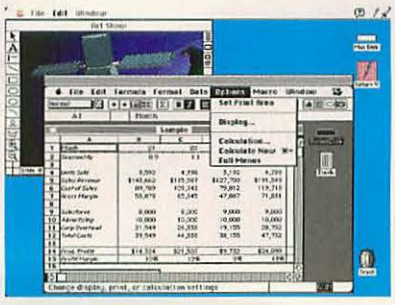
Mobius expects to introduce a two-page-display version that will have 75-dpi resolution and will list for $1345. The company is also offering a number of options for the 030 Display System, including a $295 PMMU upgrade. Until December 1, Mobius will bundle Connectix's Virtual 3.0 memory-management software with the PMMU.

Both the full-page- and two-page-display versions of the 030 Display System should be available in October. For more information, contact Mobius in Emeryville, California, at 510/654-0556.—**T.M.**

Macs to Lift Off with Saturn V

In a breakthrough for the Macintosh, Radius has designed software that lets the company's Rocket 68040-based accelerator board for NuBus operate as a separate Mac inside the Mac. Code-named Saturn V, the software offers true concurrent multitasking for the Mac for the first time, for example, letting the user off-load a big graphics file to the 040 processor on the Rocket. While the accelerator board crunches happily on the off-loaded file, the user still has all the power of the main Mac. The "second Mac" can be displayed as a separate desktop in a window, if desired.

The Rocket currently retails for $3495. The price of the Saturn V software was not set at press time. Saturn V should ship in the first quarter of 1992, Radius says. For more information, contact Radius in San Jose, California, at 408/434-1010.—**T.M.**



The Radius Rocket and Saturn V software can put a separate Mac system, including menu bar, in a window on the desktop.

Universal Mac Accelerator

DayStar Digital has brought out a universal version of its PowerCache, a 68030-based accelerator board that can speed up the SE/30, the Mac II, IIcx, IIsi, or IIci. Its most interesting feature is its universality: an included adapter connects the board to the cache slot, enabling the same basic board to work in all of the above systems. That means a user can usually keep the accelerator even when changing over from one Mac to another.

DayStar says the 50MHz PowerCache speeds up a Mac so that it's only slightly slower than it would be using a 25MHz 68040 NuBus-based accelerator. The new PowerCache shipped in August at a list price of $999 with a 25MHz 68030. With a 40MHz processor, the list price is $1299, plus another $300 for an optional 68882 math coprocessor. The 50MHz version retails for $2299, plus another $400 for the math coprocessor. A Macintosh LC version of the PowerCache is due in the second week of October. For more information, contact DayStar Digital in Flowery Branch, Georgia, at 404/967-2077.—**T.M.**

The Database Mixer

Have you ever wanted to query your personnel database for a team of employees to assign to a project? Or tried to extract from your accounting package the most important overdue invoices that add up to a specific figure?

A new database-query tool, called Selectics, puts the mathematical field known as combinatorics to work for solving just those kinds of problems. Selectics is not a database program itself: instead, it reads external databases and looks for combinations of records that meet a certain set of criteria. The program differs from SQL and other database-query tools, which find only records that meet the criteria individually.

Selectics provides controls over how much randomness the search applies. For example, a radio station could generate its playlist at random with the constraint that every fourth or fifth song be a top-ten hit and include at least two golden oldies every hour.

Selectics is not programmable, but reusable queries and information about the database are saved in a separate file that remembers and avoids bad solutions.

(continues)

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Let's say you have this outrageous design. But your color printer just doesn't get it. Looks like a job for the new Phaser™ III.

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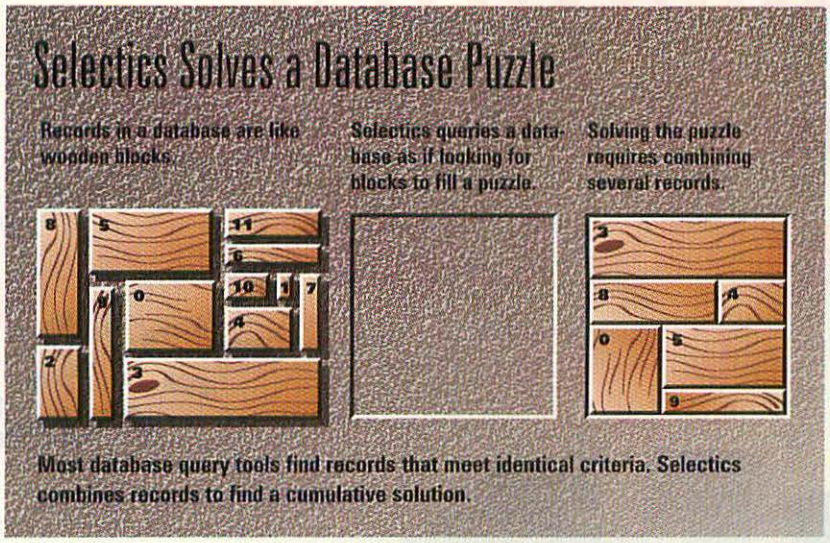
Ten MB RAM and a 24 MHz RISC chip make it the fastest printer controller around. And with Adobe's PostScript™ Language Level 2, your stuff will look great.

So go ahead. Throw out the wildest idea you can think of. The Phaser III can take it. Call 1-800-835-6100, Dept. 18C for a free output sample.

Circle 143 on reader service card



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Selectics' first version reads tab-delimited and dBase format tables, and native FileMaker and 4th Dimension databases; support for native Oracle and Apple's Data Access Language are in development. Selectics lists for $495. For more information, contact Selectics' publisher, Bit 31, in Los Angeles, at 213/472-4450.—**D.L.**

NEC Introduces MultiSync FG Monitors

NEC Technologies has introduced the MultiSync FG line of color monitors, which work with a wide range of computers including color Macintoshes. Three of the four new monitors include built-in color calibration, all of them have flat square screens, all have automatic degaussing (to prevent magnetic fields from affecting the image), and all of them meet Swedish standards for extremely-low-frequency (ELF) magnetic emissions, according to NEC Technologies.



JOHN WILLIAM LUND

The NEC MultiSync 4FG 15-inch monitor has low ELF, flexible digital controls, and built-in color calibration.

The low-end MultiSync 3FGx is a 15-inch model that lists for $749. The MultiSync 4FG is the same as the 3FGx except that the 4FG adds a set of flexible digital controls and the color-calibration capability. The 4FG lists for $899. The 17-inch MultiSync 5FG has a list price of $1599, while the 21-inch MultiSync 6FG retails for $3499. Both have all the features of the 4FG. All four of the monitors should begin shipping in October. For more information, contact NEC Technologies in Wood Dale, Illinois, at 708/860-9500.—**T.M.**

Share and Share Alike

Apple is developing version 3.0 of its file-server software, AppleShare. Version 3.0 lets the server make individual folders available rather than whole disks only, and lets users exchange CD ROMs and removable hard drive cartridges without quitting and relaunching the server software. The new version of AppleShare will include the print server software that Apple previously sold separately.

The new version has enhanced security features and bumps the maximum number of concurrent users on a server up to 120 (the previous limit was 50 users).

Apple expects to make AppleShare Server 3.0 available by the end of the year for $1199.—**Lon Poole**

Taking the Shine Off Apple

September's *Working Mother* magazine named Apple the best corporation for working moms in the San Francisco Bay Area. On September 18, a crowd gathered outside Apple CEO John Sculley's Woodside, California, mansion to protest Apple's contract with Shine Building Maintenance (SBM)—a nonunion cleaning service that pays its mostly immigrant, Spanish-speaking janitors an average of $5.25 an hour, with no paid sick days, holidays, or vacation, and no medical benefits.

The protest was called by Local 1877 of the Service Employees International Union AFL-CIO, which is organizing janitors nationwide. The union contract for janitors in Apple's area includes an average wage of $6.30 per hour; paid sick days, holidays, and vacation; health insurance for workers and their families; and a grievance procedure. The union has already helped janitors win favorable government rulings on charges of unfair labor practices, sexual harassment, and health and safety violations.



DRAKE SORBY

Janitors, union organizers, and sympathizers demonstrating outside Sculley's home.

The union is trying to hit Apple where it hurts: in the image. Apple has spent millions in advertising, PR, and charitable donations to portray itself as an enlightened, creative employer making computers for enlightened, creative people. Union officials point out that family health benefits for the 100 SBM workers at Apple would cost about $300,000 a year, less than 2 percent of the $16.8 million Sculley earned last year.

Apple argues that the issue is between SBM and its employees—not with Apple. But IBM, Sun, and many other Silicon Valley corporations contract only with union cleaning services.—**Ann Garrison.**

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The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory.	Do this: (Install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1 MB SIMMs, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256K SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four 256K SIMMs with four 1 MB SIMMs.
To upgrade an 8-socket Mac II, IIx, IIcx, oe SE 30 to this amount of memory.	**Do this: (Install in multiples of four only.)**
4 MB	Remove all four existing 256K SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1 MB in remaining sockets.
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ACC0466 MacIIcx/ci Monitor Stand ..... 49.
ACC0351 Utility Pac ..... 15.
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ACC0344 MacTilt II - 13" Color RGB ..... 75.
ACC0128 MacTilt Plus/512 - Platinum ..... 68.
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ACC0252 MacPlus/SE Carrying Case (black) ..... 65.
ACC0250 MacPlus/SE-Ext Keyboard Carrying Case 79.
ACC0591 Premier Classic Mac Plus/SE Carrying Case 69.
ACC0482 Premier Leather Case ..... 165.

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Nolo Press
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❼BUS0132 WillMaker 4.0 ..... 35.
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❼FIN0059 At Once! 1.2 ..... 189.
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❼FIN0068 WealthBuilder (Mac) ..... 95.
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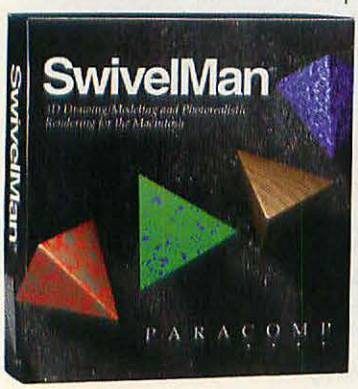
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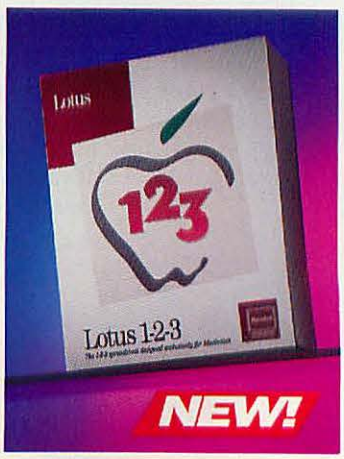
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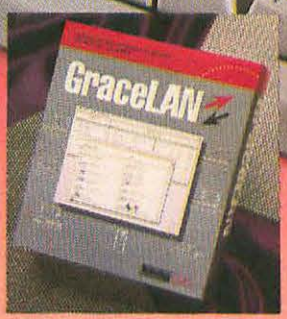
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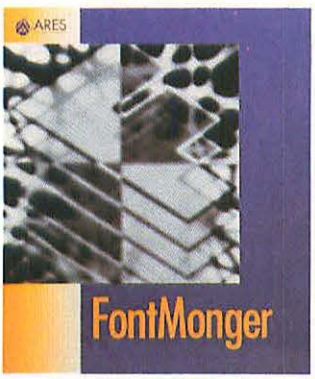
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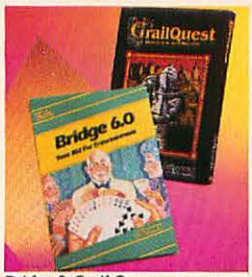
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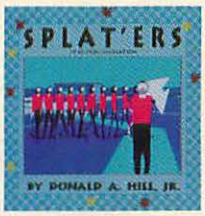


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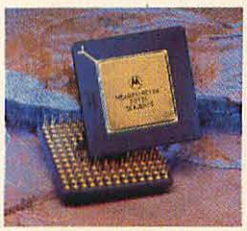
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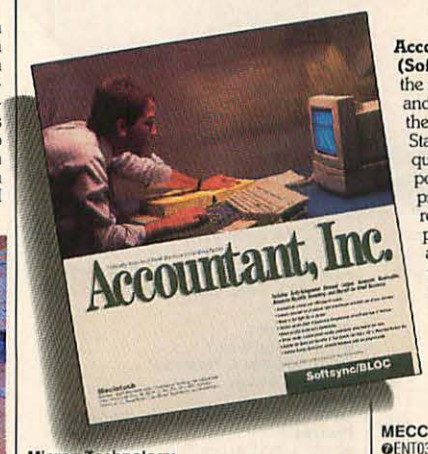


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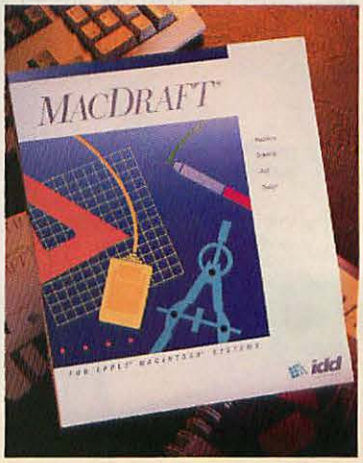
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GRA0228 MapArt EPS Format ..... 95.
GRA0229 MapArt PICT Format ..... 95.
Nordic Software
EDU0142 MacKids Preschool Pack ..... 35.
EDU0143 MacKids World Quest ..... 30.
EDU0051 MacKids Turbo Math Facts ..... 25.
❼EDU0276 Word Search Deluxe ..... 35.
Penton Overseas (Full line available)
❼VocabuLearn Level I or II: French,German, Hebrew, Italian, Japanese, Russian or Spanish ..... ea. 35.
Personal Training Systems
❼Macintosh, HyperCard, FileMaker Pro, Microsoft Excel, Microsoft Word, Aldus PageMaker 4.0, Aldus FreeHand, Aldus Persuasion, Quark XPress 3.0 ..... ea. 52.
EDU0277 Converting to System 7-part 1 ..... 52.
EDU0278 Converting to System 7-part 2 ..... 52.
Queue
EDU0109 Computer SAT Prep ..... 57.
Visionary Software
BUS0190 First Things First ..... 49.
EDU0207 LifeGuard ..... 45.
EDU0209 Synchronicity 3.0 ..... 45.
Voice & Video
Getting Started Video: Excel 2.2, PageMaker 4.0, Word 4.0 ..... ea. 55.
Advanced Techniques Video: Excel 2.2, PageMaker 4.0, Word 4.0 ..... ea. 55.
EDU0063 HyperCard Getting Started Video ..... 55.

Zondervan Publishing House
❼BOK0022 MacBible-Greek ..... 119.
BOK0031 MacBible-Hebrew ..... 119.
❼BOK0021 MacBible - King James Version ..... 79.
BOK0032 MacBible-NAB ..... 79.
BOK0033 MacBible NRSw/Apocrypha ..... 79.
BOK0034 MacBible-NIV Study Bible Notes ..... 79.
❼BOK0020 MacBible - New International Version ..... 79.

ENTERTAINMENT

Artworx
❼ENT0303 Bridge 6.0 ..... 29.
ENT0262 GrailQuest ..... 19.
Baseline
ENT0351 Talking Moose ..... 23.
Broderbund
ENT0259 Shufflepuck Cafe ..... 25.
Where is Carmen Sandiego? ..... ea. 29.
ENT0284 SIMCity ..... 29.
ENT0356 SimEarth ..... 40.
Bulls City Software
ENT0308 Moriarity's Revenge ..... 35.
Bullseye
❼ENT0046 Fokker Triplane Flight Simulator 2.8 ..... 27.
❼ENT0261 P51 Mustang 2.8 ..... 37.
❼ENT0388 SPLAT'ERS ..... 37.
Centron Software, Inc.
❼ENT0264 BlackJack Ace ..... 27.
❼ENT0329 BlackJack Strategy Tester w/ BlackJack Ace 65. ..... 27.
❼ENT0384 Canis ..... 27.
❼ENT0277 Casino Master ..... 40.
❼ENT0289 Casino Master Deluxe Mac II Version ..... 45.
❼ENT0257 CrapsMaster ..... 27.
❼ENT0383 Puzzle Master ..... 29.

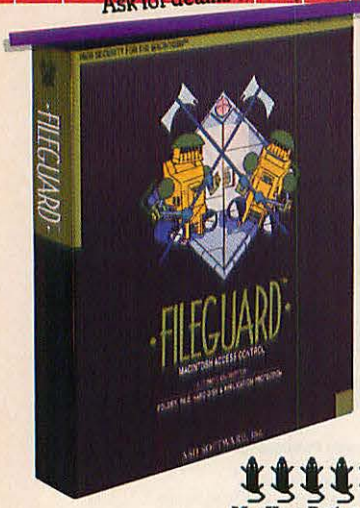
MacDraft 2.1
(Innovative Data) ❼ Provides the tools you need to create accurate drawings on your Mac. It supports PostScript output, has a removeable geometric drawing tool palette, multiple layers (limited only by available memory), on-line symbol libraries, 44 different scales, custom line styles, dimension lines, Bezier and spline curves, automatic area calculation, and smoothing of freehand shapes. MacDraft supports 32-bit QuickDraw and custom fill patterns in both black and white and color. Reads TIFF and MacDraw II files. **CAD0039 $279.**



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MacUser Rating 4/91

FileGuard 2.7
(ASD) ❼ "It's Sleek, Fast, and safe. I highly recommend it": MacUser April 1991. Protect your Hard Drives and Partitions from unauthorized access (including security bypass with a system diskette), copying and erasure; Applications and File/Folders (including system folder) from unauthorized access, deletion, and /or illegal copying; Desktop (including system folder) from alterations by unauthorized user; Keep an eye on System Usage with the system users log which continuously tracks user/group activity. System 7 compatible.
Single: **UTI0135 $139.**
Office 5 Pack: **UTI0130 $499.**
Office 10 Pack: **UTI0131 $799.**

Electronic Arts
ENT0321 Earl Weaver Baseball ..... 32.
❼ENT0355 Harpoon ..... 39.
ENT0382 PGA Tour ..... 39.
Sir Tech Software, Inc.
ENT0346 Bane of the Cosmic Forge ..... 35.
ENT0347 Wizardry II: Knight of Diamonds ..... 29.
Spectrum HoloByte
ENT0344 FACES, TETRIS, Welltris ..... ea. 25.
The Software Toolworks
ENT0281 Chessmaster 2100 ..... 32.
ENT0269 The Hunt For Red October ..... 20.
Three-Sixty
ENT0323 Sands of Fire ..... 32.
XOR Corporation
ENT0274 MacGolf Classic ..... 52.

FONTS & APPPLICATIONS

Adobe Systems, Inc.
❼DAC0028 Adobe TypeAlign ..... 65.
❼FON0264 Adobe Type Manager 2.0 ..... 59.
❼FON0351 Adobe Type On Call ..... 47.
❼FON0286 Adobe Type Set 1 or 2 ..... ea. 65.
❼FON0326 Adobe Type Set 3 ..... 129.
❼FON0434 Adobe Type Set: Letters,Memos,Faxes ... 99.
❼FON0435 Adobe Type Set: Invitations & Awards .... 99.
❼FON0436 Adobe Type Set: Overheads & Slides ..... 99.
❼FON0437 Adobe Type Set: Spreedsheets & Graphs 99.
❼FON0295 Adobe Type Reunion ..... 45.
❼Smart Art I, II, III or IV ..... ea. 65.
Altsys
❼UTI0224 EPS Exchange ..... 89.
❼FON0014 Fontographer 3.3 ..... 269.
❼FON0284 Metamorphosis Professional 2.0 ..... 89.
ARES
❼FON0361 FontMonger ..... 62.
Broderbund
GRA0295 TypeStyler 2.0 w/ATM ..... Call.
Pacific Data Products
INP0153 Pacific MacPage ..... 529.
Postcraft
DTP0062 Effects Specialist ..... 115.
QMS
UTI0169 UltraScript ..... 135.
TeleTypesetting
❼FON0343 T-Script 3.0 ..... 92.
❼FON0357 T-Script Basic ..... 55.

GRAPHICS & MULTIMEDIA

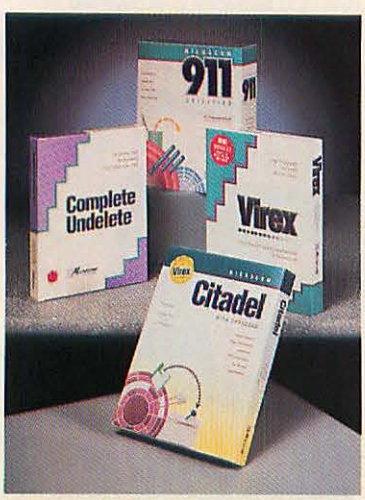
3G Graphics
❼GRA0188 Images with Impact! Accents & Borders 165.
❼GRA0111 Images with Impact! Business 1 ..... 65.
❼GRA0257 Images with Impact! People 1 ..... 95.
Abracadata
CAD0032 Design Your Own Home-Architecture ..... 65.
CAD0033 Design Your Own Home-Interiors ..... 65.
Adobe Systems, Inc.
❼DTP0054 Illustrator 3.0 (w/ ATM 2.0) ..... 379.
❼GRA0125 Streamline 2.0 ..... 122.
❼GRA0191 PhotoShop 2.0 ..... 549.



ScanMaker 600ZS & ScanMaker 1850S (Microtek)
ScanMaker 600ZS, is the newest addition to Microtek's award-winning series of color/gray-scale scanners. Capable of scanning 24 bit color, 256 shades of gray and black and white, captures images with up to 600 dots-per-inch resolutions. **INP0180 $1599.**

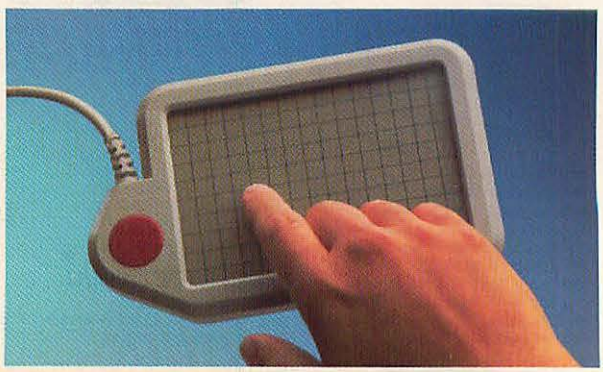
ScanMaker 1850S is a revolutionary new 35 mm slide scanner that's perfect for desktop publishing, presentation graphics and multimedia applications. Allows you to scan 24 bit color and 256 shades of gray at up to 1850 dots-per-inch resolution. Full version of Photoshop 2.0 included with both 600ZS and 1850S. **INP0176 $2369.**

Aldus
❼GRA0092 Digital Darkroom 2.0 ..... 259.
❼GRA0264 Freehand 3.0 ..... 399.
GRA0131 Super 3D 2.5 ..... 329.
❼HYP0027 SuperCard 1.5 ..... 199.
❼GRA0112 SuperPaint 3.0 ..... 135.
Baseline Publishing
GRA0242 Color MacCHEESE ..... 56.
GRA0239 Master Color ..... 99.
GRA0238 Master Paint ..... 49.
Bright Star Tech, Inc.
❼GRA0161 interFACE ..... 249.
CE Software
GRA0070 CalendarMaker 3.0 ..... 31.
Claris
❼CAD0029 ClarisCAD 2.0 ..... 645.
❼GRA0271 MacDraw Pro ..... 285.
❼GRA0117 MacPaint 2.0 ..... 89.
Dream Maker
❼GRA0105 Cliptures Vol. 1 Business Images ..... 69.
❼GRA0124 Cliptures Vol. 2 Business Images ..... 69.
❼GRA0219 Cliptures Vol. 3 Sports ..... 69.
Deneba Software
❼GRA0280 Canvas 3.0 ..... 259.
GRA0187 UltraPaint ..... 125.
Electronic Arts
❼GRA0106 Studio/8 2.0 ..... 189.
❼GRA0231 Studio/32 ..... 449.
Farallon™ Computing
GRA0221 MediaTracks™ ..... 219.
GRA0222 MediaTracks™Multimedia Pack ..... 369.
Graphsoft
BUS0184 Azimuth ..... 299.
❼CAD0024 Blueprint 2.1 ..... 219.
❼CAD0030 MiniCAD+ 3.0 ..... 595.
Innovative Data Design
❼GRA0104 Dreams 1.1 ..... 419.
❼CAD0039 MacDraft 2.1 ..... 279.
Letraset
❼GRA0151 ColorStudio ..... 599.
DTP0019 ImageStudio 1.5 ..... 139.
MECC
GRA0240 EasyColor Paint 2.0 ..... 47.
MacroMind
❼GRA0273 MacroMind Director 3.0 ..... 739.
❼GRA0276 MacroMind 3-D 1.0 ..... 1099.
❼**Metro Image Base (Full line available)**
GRA0277 Metro-ImageBasics ..... 35.
❼GRA0169 Newsletter Maker ..... 85.
Paracomp
GRA0235 FilmMaker ..... 435.
❼GRA0286 Magic ..... 259.
❼CAD0041 ModelShop II ..... 579.
❼GRA0233 Swivel 3D Professional ..... 435.
❼GRA0234 SwivelArt ..... 81.
Pixar
❼GRA0288 MacRenderMan & Showplace Bundle .. 639.
Praxitel
❼UTI0211 Read My Lips ..... 75.



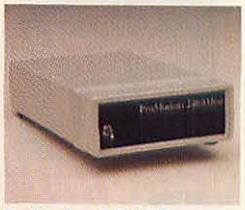
Utilities Family
(Microcom) ❼ The **Virex** application program detects and repairs files infected by Macintosh viruses. The Virex 3 INIT repairs damanged files instantly before a virus can spread. **911 Utilities**, a collection of disk and file recovery tools, protects computer-based information from loss or damage so you'll never have to worry when your Mac goes down. **Complete Undelete** maintains a"Delete Log" of files thrown in the trash and recovers them if they were accidently thrown away. **Citadel** with Shredder, a security tool box, protects your computer from unauthorized access.
Virex **UTI0093 $59.**
911 **UTI0191 $89.**
Complete Undelete **UTI0140 $49.**
Citadel **UTI0233 $93.**

The UnMouse
(Microtouch) ❼ The UnMouse does everything a mouse can—only faster, easier, and in less space. To move the cursor, simply slide your finger over the glass surface. To make a selection merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and you have a Power Keypad with 16 keys instantly available to execute macros (60 in advanced mode). With its one million touch points the UnMouse also performs as a small graphics tablet. **INP0084 $159.**





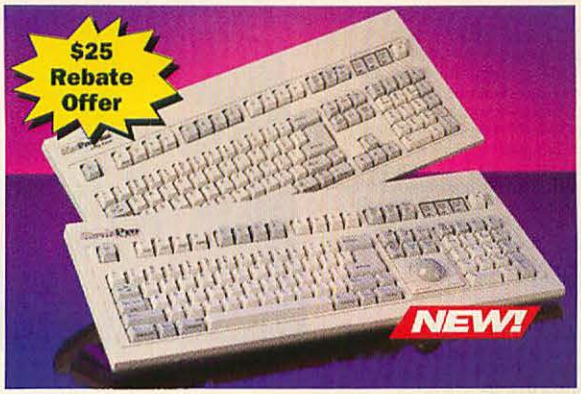
Word Search Deluxe
❼ Perfect for newsletters, classrooms, and puzzle enthusiasts everywhere. Fun to create. Fun to play. Improve your vocabulary in any subject. Use as stand alone application to create, play and print word search puzzles or use in combination with word processing, paint and page layout programs for more decorative results. Supports color and digitized sounds. **EDU0276 $35.**



ProModem 2496 S/R Minifax Plus
Complete data/fax solution in a mini-size. Get up to 9600 bps throughput on this 2400 bps data modem with V.42bis/MNP-5 data compression and error correction. Plus you get 9600 bps send/receive fax, all the software, and cable. **MOD0076 $279.**

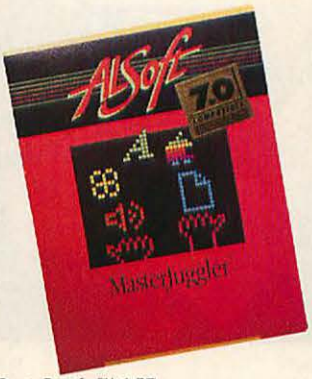


Wingz 1.1
❼Wingz HyperScript programming language makes custom applications easy to create and use. Incredible 2D and 3D graphics (in color on the Mac II). Wingz provides over 20 different graph types, and you can rotate, elevate, and change the viewing perspective freely. **BUS0064 $245.**

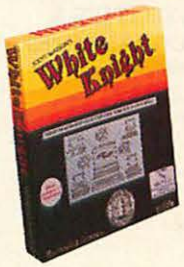


TrakPro
(Key Tronic) ❼ Features a 101-key layout similar to an Apple Extended keyboard, with the convenience of an integrated trackball. Includes 7 user-definable buttons with Control Panel software, interchangeable Caps Lock and Ctrl keys, Period/Comma lock, adjustable key feel. **INP0192 $219.**

MacPro Plus
❼ Compatible with all Macintosh computers, the enhanced 105-key layout includes Period/Comma lock capability. Also, the connecting cable you need is offered at no extra charge. The keyboard is backed by a limited-lifetime warranty and unlimited toll-free product support. MacPro Plus comes with a $25.00 trade-in offer direct from Key Tronic on most Mac compatible keyboards when you pruchase the MacPro Plus. Both keyboards include a Free offer for Tempo II. **INP0156 $145.**



MasterJuggler™ 1.57
(AISoft, Inc.) ❼ MasterJuggler™ 1.57 is system 7.0 compatible. It greatly extends the power of your Macintosh and System 7.0 by giving you instant access to unlimited numbers of fonts, DAs, FKeys, and sounds. You can easily use up to 120 of these resource files without having to install them in your System file. MasterJuggler has full support for the new True Type fonts and Balloon Help. MasterJuggler also lets you start applications and their documents or switch between them from a convenient pop up window. *MacUser* 5 Mice rating. **UTI0110 $55.**



White Knight V.11
❼The perfect low-cost solution to almost any Mac User's telecommunication needs. Offers the kind of power associated with products costing hundreds of dollars more. Winner of 11 awards including MacWorld's World Class Software Award. **COM0060 $85.**

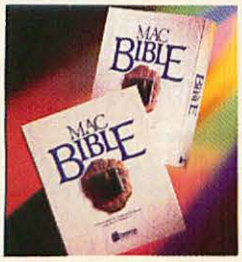
Strata
❼GRA0274 StrataVision 3D 2.0 ..... 629.
SuperMac
❼GRA0253 PixelPaint 2.1 ..... 159.
❼GRA0249 PixelPaint Professional 2.0 ..... 499.
T/Maker Co.
GRA0039 ClickArt Business Image ..... 32.
GRA0272 ClickArt Color Graphics for Presentations 99.
GRA0088 ClickArt EPS Illustrations ..... 82.
GRA0270 ClickArt-Events and Holidays ..... 32.
Virtus
❼GRA0276 Virtus WalkThrough ..... 259.
Zedcor
❼GRA0199 DeskPaint & DeskDraw 3.03 ..... 113.

Digital Vision, Inc.
GRA0145 Computer Eyes B & W ..... 199.
❼GRA0154 Computer Eyes For Mac-Color ..... 349.
ICD
INP0095 Grafiex ..... 82.
Kensington
INP0060 Turbo Mouse ADB (SE or II) ..... 109.
Key Tronic
❼INP0156 MacPro Plus ..... 145.
❼INP0192 TrakPro ..... 219.
Koala
INP0127 MacVision 3.0 ..... 269.
Microspeed
INP0126 MacTRAC 2.0 ..... 75.
INP0140 MacTRAC DB9 ..... 62.

Sophisticated Circuits
ACC0535 Power Key w/Quickeys Lite ..... 64.
ACC0619 Power Key Remote ..... 35.
Wacom
INP0151 Digitizing Tablet 12" x 12" ..... 845.
INP0177 Digitizing Tablet 12" x 12"-Electrostatic 929.
INP0179 Dizitzing Tablet 6" x 9" ..... 589.



INIT Info Pro (Baseline)❼ The most complete list of INIT and application conflicts in existence. Includes hundreds of pages of facts and provides HyperCard stacks which examine all the drives connected to your Mac and complies a report of the problems. **UTI0238 $39. Talking Moose** uses charming, random messages to relieve the tedium of working long hours on your Mac. **ENT0351 $23. Screenshot** makes capturing the image simple and easy. Hit the user-definable key combination and the CDEV pops up a menu to specify whether you want to print it or save it. Captures whole screen windows, menus, or selected portions of the display. **UTI0183 $34.**



MacBible - King James Version
❼Revolutionize the way you study the Scriptures. Includes a flexible word-and-phrase search mode, a verse mode for displaying any range of verses, and a count mode for showing statistical information about words. **BOK0021 $79.**



BeagleWORKS
❼This new, integrated program offers a full-working word processor with spelling checker and thesaurus, spreadsheet with charting, database, paint, draw and communications modules all in one package. Lets you combine data from all other modules into a single document and make changes (edit in context) without leaving that document. **BUS0189 $209.**

HARDWARE & PERIPHERALS

Caere
❼INP0205 TypistPlus ..... 479.
CoStar
❼INP0198 LabelWriter II ..... 199.
Epson
INP0167 Epson EPL-7500 Laser Printer ..... 2599.
INP0173 Epson PostScript Kit ..... 1599.
Seikosha
INP0041 Seikosha SP 2000 AP Printer ..... 235.
Sharp
COMP007 Wizard OZ 7000 (32KRam) ..... 229.
COMP018 Wizard OZ 7200 (64KRam) ..... 255.
COMP019 Wizard Oz 8000 (64KRam) ..... 329.
COMP023 Wizard Oz 8200 (128KRam) ..... 399.
ThunderWare
INP0116 LightningScan 400 ..... 385.
INP0189 LightningScan Pro 256 ..... 539.
❼INP0007 ThunderScan Plus ..... 199.

INPUT & OUTPUT

Abaton
❼INP0157 Scan 300/Color ..... 1499.
INP0164 LaserScript Printer LX ..... 1729.
Articulate Systems
❼INP0160 Voice Navigator II ..... 649.
Datadesk International
INP0174 Mac101E Keyboard ..... 129.
INP0183 Mac 101E Keyboard w/Quickeys 2 ..... 149.

Microtek
❼INP0180 Microtek ScanMaker 600ZS ..... 1599.
❼INP0176 ScanMaker 1850S ..... 2369.
❼INP0162 TrueLaser Printer ..... 2019.
MicroTouch
❼INP0084 The UnMouse ..... 159.
Mouse Systems
❼INP0132 Little Mouse ADB ..... 74.
❼INP0199 A³ Trackball ..... 75.

MEMORY UPGRADES & ACCELERATORS

Connectix
❼DRI0385 MC73 ..... 159.
UTI0144 Virtual 030 2.0 VM3 ..... 113.
DRI0185 Virtual 2.0 PMMU ..... 188.
DayStar Digital
❼DRI0224 64K FastCache IIci ..... 279.
❼DRI0288 40 MHz PowerCache (IIci) ..... 959.
❼DRI0290 50 MHz PowerCache (IIci) ..... 1699.
❼DRI0416 RAM PowerCard ..... 749.
Dove
❼DRI0130 MaraThon 030 (MacII) ..... 599.
❼DRI0198 MaraThon 030 - (Mac SE) ..... 399.
❼DRI0197 MaraThon 030 - (Mac Plus) ..... 399.
❼DRI0151 MaraThon 030-SE/030 ..... 599.
❼DRI0380 Marathon Racer For Mac II ..... 1079.
❼DRI0378 Marathon Racer For Mac Plus ..... 599.
❼DRI0379 Marathon Racer For Mac SE ..... 599.
Impaq
CHP0043 512K Video SIMM Upgrade ..... 149.
Micron Technology
❼DRI0321 PicturePress Card (Xceed ICDP-II) ..... 745.
MicroTech International, Inc.
CHP0025 Mac Classic 1 Meg Upgrade ..... 79.
CHP0026 Mac Classic 3 Meg Upgrade ..... 179.
DRI0315 Mac Classic Upgrade Kit 20-1 ..... 399.
DRI0317 Mac Classic Upgrade Kit 40-1 ..... 499.
DRI0318 Mac Classic Upgrade Kit 40-3 ..... 575.



The "ULTIMATE" SE Carrying Case (I/O Design, Inc.) The "ULTIMATE" SE Carrying Case is designed with the same high quality standards as other MacLuggage products. This case offers internal, padded compartments for ANY Macintosh keyboard, mouse, external hard disk and cables, also holds the new Macintosh Classic. It features 2 additional exterior pockets for everything from disks to umbrellas. Combine these features with sturdy Dupont Cordura nylon and 1/2 inch high density foam padding and you'll see why this is the "Ultimate" carrying case for your Mac. Available in black and navy blue. **Black: ACC0427 $85. Navy: ACC0440 $85.**

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QuickTools™ (Advanced Software) ❼ A collection of eight Macintosh utilities. Just pop them into your system folder and the way you use your Mac will change forever. You can make QuickTools work the way you want by changing easy-to-understand settings in your control. **UTI0239 $45.**

Intouch 1.0 ❼ Convenient DA that stores an unlimited number of names, addresses, and phone numbers. Also prints envelopes and mailing labels, and even dials the phone for you. **UTI0192 $39.**

Docucomp 1.5 ❼ Version control has never been easier! Compares any two document versions and reports changes as minor as an inserted comma, and as major as a complete rearrangement. **DTP0041 $89.**

Newlife
❼DRI0419 Accelerator Classic 20MHz 68030 ..... 499.
❼DRI0420 Accelerator Classic 16MHz 68030/68882569.
❼DRI0417 Accelerator SE16 MHz 68030 ..... 499.
❼DRI0418 Accelerator SE 16 MHz 68030/68882 ... 599.
PowerUser™
❼CHP0013 1 Meg Simm 100ns PowerUser ..... 59.
Total Systems
Gemini & Gemini Classic (Full line available)
❼DRI0302 Gemini 25 MHZ Card ..... 1135.
❼DRI0360 Gemini Classic 20MHz 68030 ..... 979.
❼DRI0361 Gemini Classsic 20MHz 68030/68882 1079.
❼DRI0362 Gemini Classic 25MHz 68030 ..... 1229.
❼DRI0364 Gemini CLassic 33MHz 68030 ..... 1499.
❼DRI0265 Gemini Plus Kit ..... 129.
❼DRI0295 Mercury 16MHz 68030 - Plus ..... 499.
❼DRI0297 Mercury 16MHz 68030 - SE ..... 365.
❼DRI0299 Mercury SCSI Module - Plus ..... 209.

MODEMS & FAX

Abaton
MOD0034 InterFax 24/96 ..... 299.
Dove
❼MOD0038 DoveFax Desktop ..... 295.
❼MOD0053 Dove Fax Plus ..... 359.
Global Village
❼MOD0049 TelePort 2400 ADB Modem ..... 139.
❼MOD0058 TelePort/Fax 9600 ..... 185.
Hayes
COM0023 Smartmodem 2400 ..... 349.
MOD0017 Smartmodem 9600 (V series) ..... 589.
MOD0060 Personal Modem 2400 Plus w/Smartcom149.
MOD0065 Bundle V-Series Ultra SmartModem 9600829.
PowerUser™
MOD0062 24/96 Mini Send Receive Fax Modem .. 199.
MOD0043 2400 BPS Mini Modem ..... 99.
MOD0047 Mini Send Fax 2400/9600 ..... 149.
MOD0071 9600 bps/ V.32&V.42bis Modem ..... 459.
MOD0070 2400 bps V.42bis Mini Modem ..... 149.
Practical Peripherals
MOD0072 SmartPack 2400V.42 bis ..... 219.
MOD0073 SmartPack 9600 V.32/V.42 bis ..... 549.
Prometheus
❼MOD0052 9600M Plus Modem ..... 599.
MOD0068 ProModem 2400 Mini Plus ..... 169.
❼MOD0076 ProModem 2496 S/R Minifax Plus ..... 279.
❼MOD0064 ProModem Ultima ..... 699.
❼MOD0035 TravelModem ..... 199.
❼NET0067 NetModem V.32 (9600) ..... 1169.

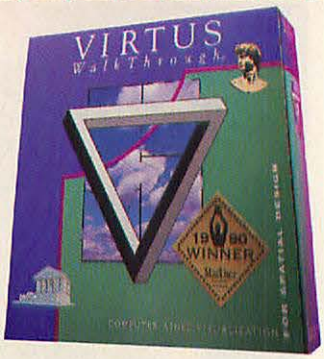
MUSIC & SOUND

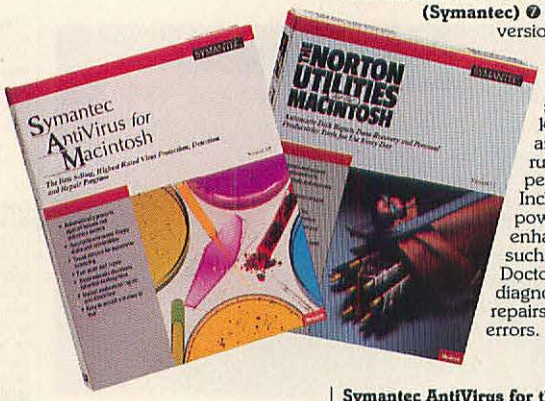
Coda Music Software
❼MUS0044 Finale 2.6.1 ..... 549.
Electronic Arts
MUS0004 Deluxe Music Construction 2.5 ..... 85.
Farallon™ Computing
MUS0036 MacRecorder® 2.0 ..... 174.
Opcode Systems
MUS0083 MIDI Translator ..... 43.
Repertoire
MUS0034 Music Publisher 2.5 ..... 359.

SECURITY & VIRUS PROTECTION

ASD Software, Inc.
❼UTI0135 FileGuard 2.7 ..... 139.
❼UTI0130 FileGuard 2.7 - Office Pack 5 ..... 499.
❼UTI0131 FileGuard 2.7 - Office Pack 10 ..... 799.
❼ACC0539 MaccessCard Reader ..... 299.
Fifth Generation System
❼UTI0120 DiskLock ..... 118.
Kensington
ACC0235 Apple Security Kit ..... 34.
PassProof ..... ea 69.
Kent Marsh
❼UTI0212 FolderBolt ..... 79.
❼UTI0028 MacSafe II ..... 107.
❼UTI0064 NightWatch 1.03 ..... 86.
Microcom
❼UTI0093 Virex ..... 59.
❼UTI0150 Virex 10-pack ..... 429.
Symantec Corporation
❼UTI0214 Symantec Antivirus for Mac 3.0 (SAM) .. 65.

Virtus WalkThrough 1.03 (Virtus Corporation) ❼ Virtus WalkThrough 1.03 is the first 3D drawing and visualization program that lets you walk through your ideas. The software's interactive design environment is ideally suited for architects, engineers and designers of all types. An integrated set of modeling and presentation tools allow users to create and communicate their ideas in real time. Virtus WalkThrough's complete set of 3D tools and user friendly interface make it the perfect compliment to your design and business presentation programs. **GRA0278 $259.**





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❼UTI0236 Calc+ ..... 39.
❼UTI0113 CanOpener ..... 62.
Advanced Software
❼UTI0192 Intouch 1.0 ..... 39.
❼UTI0239 QuickTools ..... 45.
Aladdin Systems
❼UTI0145 StuffIt Deluxe 2.0 ..... 62.
ALSoft
❼UTI0132 DiskExpress II 2.07 ..... 55.
❼UTI0110 MasterJuggler 1.57 ..... 55.
Alysis
❼UTI0232 SuperDisk! 1.7 ..... 55.
Baseline Publishing
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❼UTI0238 Init Info Pro ..... 39.
❼UTI0187 INIT Manager ..... 34.
❼UTI0190 Personality ..... 49.
UTI0183 ScreenShot ..... 34.
Berkeley System Design
❼UTI0119 After Dark 2.0 ..... 29.
❼UTI0230 More After Dark ..... 25.
❼UTI0231 More After Dark/ After Dark 2.0 Bundle .. 45.
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❼UTI0063 FastBack II 2.5 ..... 118.
❼UTI0087 SuitCase II 1.2.1 ..... 49.

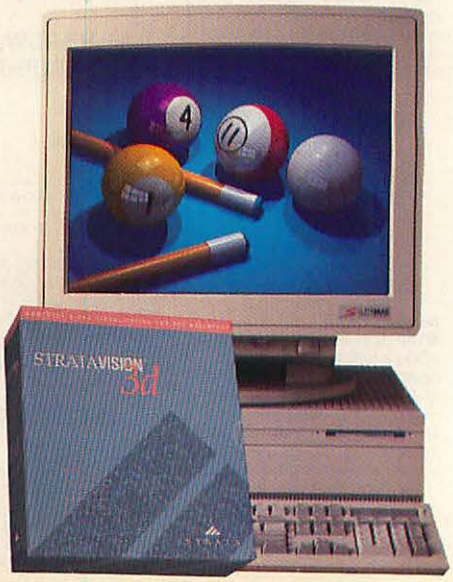


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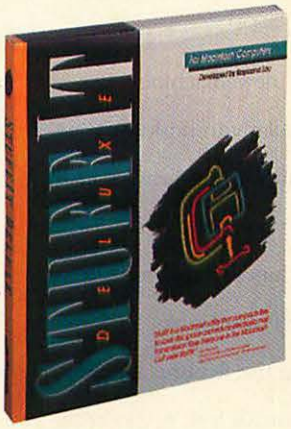
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You can now contact MacWAREHOUSE or place orders with us in the **Electronic Mall** on CompuServe. The **MacWAREHOUSE GO code is GO MW.** As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.



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Insight Developement
❶UTI0096 MacPrint 1.2 ..... 95.
Magic Software
❶UTI0077 Autosave II 2.0 ..... 26.
Microcom
❶UTI0191 911 ..... 89.
❶UTI0233 Citadel ..... 93.
❶UTI0140 Complete Undelete ..... 49.

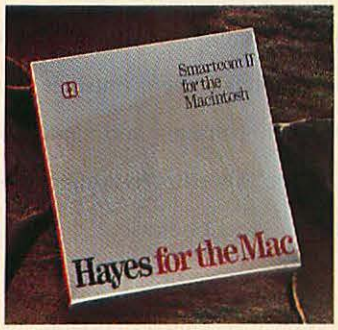


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❶UTI0168 Screen Locker ..... 45.
ON Technology
UTI0142 ON Location ..... 75.
Salient
❶UTI0179 DiskDoubler 3.7 ..... 49.
SNA
UTI0207 Offline 2.0 ..... 65.
SuperMac
❶UTI0203 DiskFit 2.7 ..... 65.
Symantec Corporation
❶UTI0151 Norton Utilities for the Mac ..... 87.
❶UTI0240 NUM 1.1 & SAM 3.0 Bundle ..... 119.
❶UTI0078 Symantec Utilities for Mac II (SUM) ..... 99.
❶LNG0051 THINK C 5.0 ..... 199.
❶LNG0002 THINK's Pascal 4.0 ..... 165.
Zedcor
❶LNG0031 ZBasic 5.0 ..... 99.

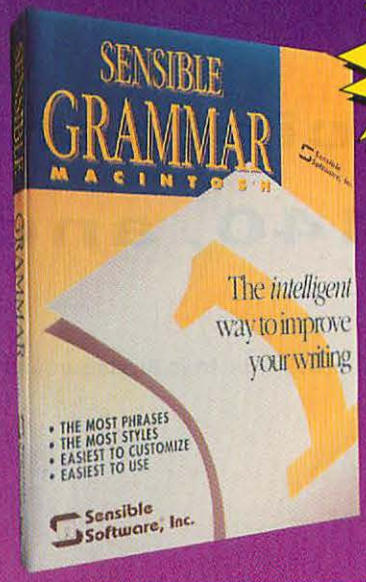
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❶SPL0029 Thunder 7 ..... 56.
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UTI0237 OmniPage 3.0 ..... 495.
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❶UTI0215 WordScan ..... 439.
❶UTI0216 WordScan Plus ..... 739.
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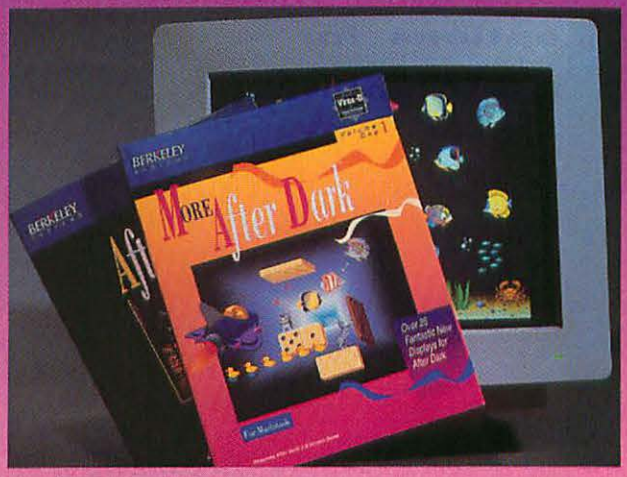
Smartcom II Mac 3.3 (Hayes) ❶ Smartcom II Mac takes full advantage of the Mac interface. To activate the major functions, just click on an icon. If you are connected to another Smartcom II user, you can exchange graphics interactively in real time. Use the Autopilot to record frequently used sequences and streamline your communications. It also provides a simple interface for all the advanced features of Hayes Smartmodem and V-Series products, including the Ultra 96. Now supports System 7.0, including the Communications Toolbox, Balloon Help, and Selected Core Apple Events. **COM0015 $84.**

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Macintosh POWERBOOKS 100, 140, and 170

No longer must your shoulder ache from lugging around a Mac Portable, a headless IIci, or a compact Mac. Nor must you work furtively on a DOS notebook when on the road. Portable computing is now a reality for the Mac in the form of the PowerBook series: three lightweight notebook computers that let you work wherever you want to—on the couch, on a plane, or in a remote mountain cabin.

Three portable computing options for the Macintosh

It took Apple years to offer these new machines, but at least they're real Macs that perform similarly to desktop Macs, with comparable CPUs and internal hardware. (Macworld Lab tests show that the PowerBooks run at about 80 percent the speed of the comparable desktop machines, a difference due mostly to the slower refresh rate for the PowerBooks' screens.) Although Apple succeeded in delivering the features expected in a notebook while retaining the Macintosh feel, Apple broke no technological ground in developing the PowerBooks. These notebook computers aren't perfect, and they won't replace a desktop Mac. PowerBook users will have to get used to a murkier screen, mushier keys, a condensed keyboard, limited-life batteries, and a new kind of trackball. But each of the three PowerBooks weighs less than 6.8 pounds and fits easily inside a briefcase.

by Galen Gruman

Apple apparently learned its lesson from the overpriced, overweight Macintosh Portable and has finally come up with something longtime Apple-watchers never thought they'd see: usable notebooks at competitive prices. The basic 100 model costs about $2500, the basic 140 about $2900, and the basic 170 about $4600. The 100's price compares favorably with the

PHOTOGRAPHS BY MARK JOHANN



From top to bottom: Macintosh PowerBooks 100, 140, and 170.

price of an 80286-based notebook from Compaq, Dell Computer, or Zeos International, while a 4MB 140 at $3200 is roughly equivalent to an 80386-based notebook from Everex or AST. The price of the high-end 170 is competitive with Compaq's LTE 386s/20 because the 170 includes a built-in fax modem and additional memory that cost extra with the Compaq.

The notebook market is the fastest-growing segment in the DOS industry, accounting for 13 percent of sales this year and surging ahead of desktops in annual growth. Apple wants a share of this burgeoning market, as evidenced by its competitive pricing and bold product introduction at Comdex, always a DOS-centered trade show. Like the major United States–based DOS notebook manufacturers, Apple has decided to hold the price of its notebooks despite the recent tariff imposed on Japanese active matrix screen displays used in many notebooks, including the PowerBook 170. Apple is likely to shift production of the 170 away from the United States to its overseas plants to avoid the tariff, which may make 170s scarce initially.

Although all three notebooks look similar in their slate-gray casings, they differ on the inside. The low-end 100 is a lighter, cheaper, no-frills machine with a 68000 CPU and no internal floppy drive. Sony—which manufactures the 100 for Apple—took the original Portable and miniaturized the components. In contrast, the business-oriented 140 and 170 were developed and manufactured by Apple and share the same internal architecture. They're both built around 68030 CPUs and offer a choice of hard drive and memory options. The 170 offers even more: a built-in modem, math coprocessor, and superior display.

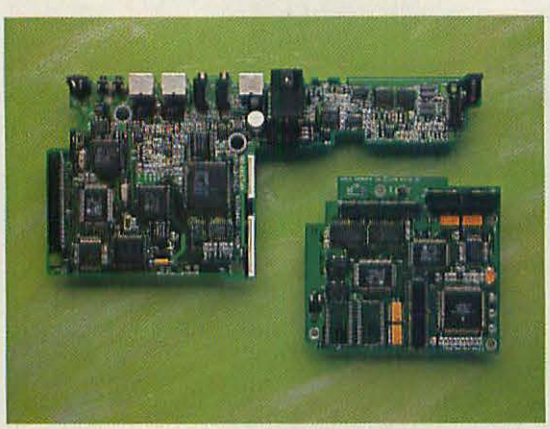
Apple is making the notebooks available almost simultaneously in all languages supported by Apple except Japanese, since the required kanji ROM has not yet been developed. No target date for the Japanese-language versions was set at press time.



Keyboard Layout The three PowerBooks share the same keyboard, based on the Macintosh Classic layout. The keys are slightly closer together than on a desktop keyboard, which requires some getting used to for touch-typists.



Connectivity Features The three PowerBooks offer the same basic ports, although the 100 (top) and 140 (not shown) and 170 (bottom) differ slightly in layout because they use different logic boards. The on/off, restart, and interrupt buttons are located on the back of the 140 and 170, where they are out of casual reach; on the 100, the buttons are located on the left side panel.



Logic Board Designed to conserve horizontal space, the 140's logic board wraps around the floppy drive. The use of a piggyback board—essentially a second story—saves precious horizontal space without requiring the use of an expensive, very-high-density logic board. The 170's logic board is identical to the 140's, except for the addition of a math coprocessor.

What the PowerBooks Share All the PowerBooks have a smaller keyboard based on the layout of the Macintosh Classic's keyboard (complete with awkward, horizontally placed cursor keys). The PowerBooks' keyboard is 2 percent narrower and 5 percent shorter than the Classic's keyboard. While this is only a slight difference, it was immediately noticeable to touch-typists on *Macworld*'s staff, but most people found it easy to adjust to after about 15 minutes. Still, switching back and forth between a notebook and full-size keyboard requires readjustment each time, something most DOS notebooks avoid by offering users full-size keyboards.

Also, the PowerBooks' keys are a tad rubbery compared to the harder, more tactile keys on desktop Macintosh keyboards, but this extra give makes them more appropriate for use in unsteady environments like trains, planes, and automobiles. Some *Macworld* editors thought the keyboards were a bit noisy for use in conferences or meetings, and the extra resiliency in the keys may be trouble-

some when you are working on a table or desktop. Small adjustable legs on the back of the casing let you choose from two keyboard angles for more comfortable typing.

The notebooks' built-in pointing device is a trackball positioned below the spacebar, with buttons above and below in a crescent shape. You can move the trackball with either thumb while keeping your hands on the keyboard, or you can move your hand down to control the trackball with, say, your index finger. Although it is easier to control a trackball with an index finger, the PowerBooks' design tempts you to rely on your thumb instead. But this requires extending the thumb farther away from the hand than is comfortable for ongoing use. Of course, you can attach a mouse through the Apple Desktop Bus (ADB) port, but it isn't very convenient to use when working on an airline tray table. So far, the side-mounted clip-on trackballs available on DOS notebooks are unavailable for the PowerBooks.

Instead of placing the spacebar and other bottom-row keys at the edge of the notebook's casing, Apple set the trackball so that the case doubles as a palm rest. Apple touts this as an ergonomic advantage, but only time will tell—notebooks in general are not terribly ergonomic because there is no way to adjust the screen and keyboard positions independently.

Battery Management The problem with running a notebook from a battery is that the battery always runs out too soon. In the PowerBooks, Apple has implemented typical battery-management features to prolong effective working time: sleep, which turns off the entire system (but leaves unsaved contents in memory) after a user-specified period of inactivity; rest, which turns off or slows down components like disk drives, screen lighting, and CPUs, after a specified period of inactivity; and automatic warnings that alert you to imminent power loss. Pressing a key or clicking the trackball reawakens a sleeping or resting system.

Connecting to the Outside World All three notebooks come with a universal AC adapter for the international traveler. You can even recharge the battery while using the notebooks with AC power, but it takes longer than when the notebooks are turned off, since only the power not needed during use is diverted to recharging the battery. You can recharge the batteries up to 500 times before needing to replace them.

The PowerBooks are real Macs that perform similarly to desktop Macs with comparable CPUs and internal hardware; they're just smaller

The PowerBooks run the new System 7.0.1. They also come bundled with AppleTalk Remote Access, a new program that lets you easily transfer files and run applications from a network or desktop Mac while the PowerBook is connected via a telecommunications device, such as a modem. To use this program, you need it on both your notebook and the Mac you connect to. (The program also sells separately for $199 for use on any Mac.) The convenience of no-hassle access to your everyday system from wherever you happen to be is a great boon for portable computing, even if you have to do it at the slow rate of a phone connection (see "The Portable Finder," *Macworld News,* in this issue).

Also common to the three notebooks is a new SCSI port, the HDI-30, whose 30-pin high-density design leaves room on the machines' back panel for other ports. Adapters will be available to connect to standard 50-pin SCSI cables; connectors to 25-pin cables are expected later from other companies, although it's possible that devices with proprietary cabling may have compatibility problems. Other connections include RS-422 serial ports for printers and networks, and ADB connectors for extended keyboards, mice, and other input devices (as many as three may be daisy-chained to the ADB connector). All three notebooks support sound output, but only the 140 and 170 have sound input and come with external microphones.

But the notebooks lack one basic feature that even the Portable has: a video-out port. This port is standard fare on most DOS portables and notebooks for good reason; its omission means you can't use a color or large monochrome monitor when you're at a desk, or drive an LCD overhead projector or a large conference-room monitor for presentations. In both cases, you have to transfer data (and maybe applications and fonts) to a machine with the appropriate display. Because users rightly object to such extra work, several third-party developers offer notebook add-ons to address this and other lacks (see "Options, Options").

The PowerBooks 140 and 170 Each of the high-end PowerBooks measures 11.3 by 9.3 by 2.3 inches and weighs 6.8 pounds (slightly larger and heavier than three *Macworld* magazines stacked up). The PowerBooks also share the same logic boards and rugged polycarbonate casing. But the 170 boasts more-powerful processing capabilities, thanks to its 25MHz 68030 CPU and a 68882 math coprocessor. The 140 has a 16MHz 030 CPU and no coprocessor (nor can you install one later).

The 170 also offers a superior display: an active matrix thin-film transistor liquid crystal display (LCD) that boasts clean, crisp text and graphics even when viewed from a distance and from most angles. This is the same technology used in the Macintosh Portable, although the 170's newer screen is even sharper and brighter, perhaps because of improvements in the lighting approach used. The 140 uses a murkier supertwist LCD display with a narrower range of viewing angles, and it is covered by a clear, rubberlike film that you can damage with a pencil tip or

How the Notebooks Stack Up

by Tim Warner

AST Premium Exec 386SX/20



10.0 | 7.4 | 2:11 | 3:1

Only the PowerBooks were smaller than the AST Premium Exec. Unfortunately, the Premium Exec's 8.5-inch display feels cramped, and the keyboard layout is awkward, with overlarge enter and backslash keys, and the insert and delete keys at the bottom.

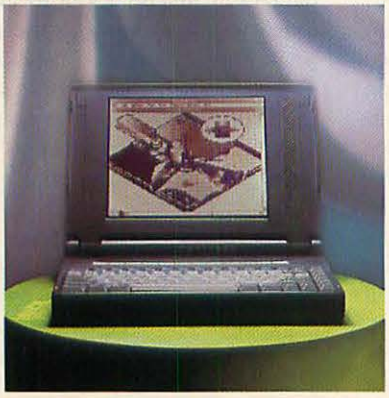
Compaq LTE 386s/20



10.4 | 8.1 | 1:21 | 12:1

With a 60MB hard drive and 5MB of RAM, the Compaq LTE 386s/20 is a strong performer. Its display contrast was the highest, and its brightness among the best. The keyboard has firm, large keys. The LTE also offers a sliding door to cover the I/O ports.

Everex Tempo LX 386SX/20



11.5 | 7.6 | 2:11 | 6:1

While it's no beauty, this black box won me over with its well-organized status lights. But the LX fails on keyboard layout and display quality. More than any notebook reviewed here, the LX suffers a trailing-shadow effect of dark areas or patterns on the screen.

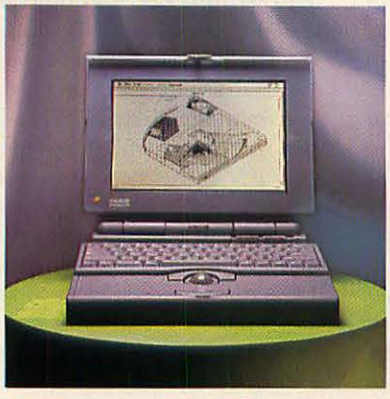
Macintosh PowerBook 100



8.6 | 5.2 | NA* | 11:1

The 100's contoured casing looks slightly different from that of the other PowerBooks. The PowerBook 100's LCD is smaller than the 140's and uses the same technology, but it is a little murkier. The lack of an internal floppy drive is awkward.

Macintosh PowerBook 140



8.6 | 6.7 | NA* | 8:1

The 140 shares most of the 170's pros and cons. The only real difference is that the 140's LCD is murkier and is readable from fewer angles. But the LCD is as good as, and often better than, LCDs used in DOS notebooks.

Macintosh PowerBook 170

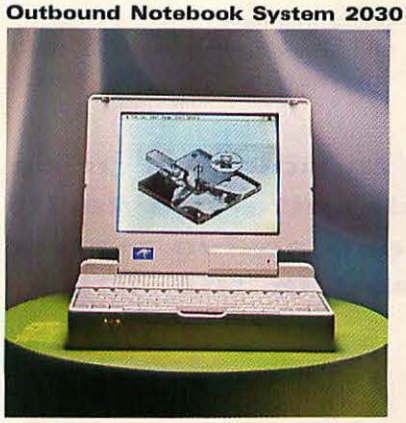


8.8 | 6.9 | NA* | 12:1

The PowerBook 170's clear, readable screen makes it the power user's choice. Well-implemented battery-management features make the 170 a great travel companion. The only design flaws: its slightly condensed keyboard and side-mounted floppy drive.

** Not available for testing.*

Outbound Notebook System 2030











The Outbound runs System 7, has very good battery management, a high-density drive, all the I/O ports you need, and a good keyboard. The main flaw is the Outbound's TrackBar, an alternative input device mounted in front of the spacebar.

Safari NSX/20











The Safari, with its curved vents, teal and gray colors, and well-designed keyboard, is sleek enough to tempt even the Mac faithful. It also has sophisticated power management. The screen has good brightness and contrast but a slow refresh rate.



Total weight: Computer, two batteries, power supply and cable, two floppy disks, carrying case, and mouse (where applicable).



On-lap weight: Notebook computer, one battery, and mouse (where applicable).



Battery life: Measured in hours:minutes.



Contrast ratio: The higher the ratio, the better you can see details in light or dark areas of an image.

MW LAB Testing All Notebooks

All times are in seconds.

CPU Performance

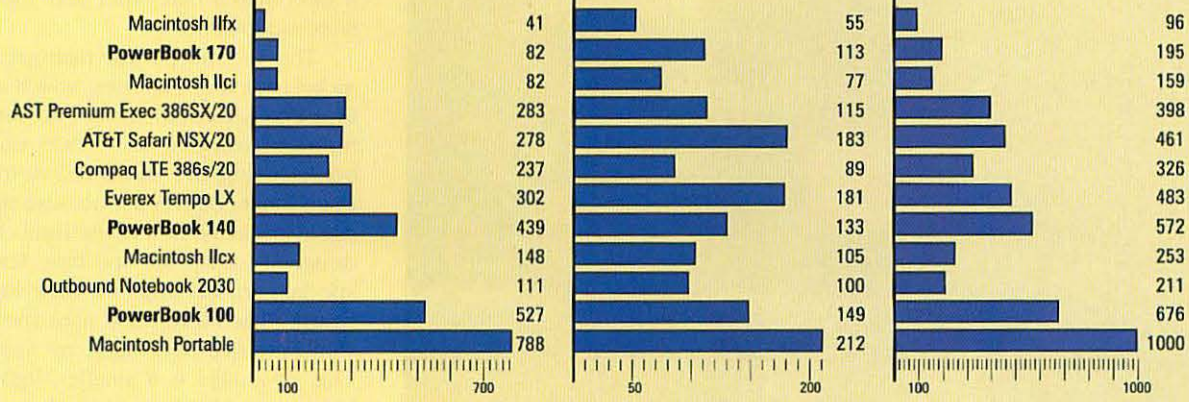
Total times for three tests designed to measure CPU performance: Find/Change in a 102-page Microsoft Word 4.0 document (Word 1.1a for DOS notebooks), and Open and recalc in Microsoft Excel 3.0.

Peripheral Performance

Total times for three tests involving scrolling information on screen and opening files in Word and Excel. These operations do not require CPU time, but do rely heavily on screen-refresh rates and drive access speed.

Total Performance

Total time for all six test sets.



These notebooks are grouped by comparable CPUs (test times for the Mac IIfx are provided as a reference point). Slower LCD screen-refresh rates are the main reason that the PowerBook 140 and 170 are slower than their desktop Mac equivalents (the 100 has no equivalent). The DOS notebooks are slower than comparable Macs primarily because they are running Windows 3.0, a sluggish performer. Because of its math coprocessor, the PowerBook 170 is significantly faster than the PowerBook 140 in the CPU performance tests.

sharp object (see "How Liquid Crystal Displays Work"). The 140's LCD screen has a slow refresh rate, especially noticeable when you are moving objects around. You lose the pointer for a split second, for instance, even when moving at moderate speeds. This effect is due to the LCD technology itself and is certainly not Apple's fault, but it is bothersome and will certainly disappoint anyone used to CRT or active matrix displays.

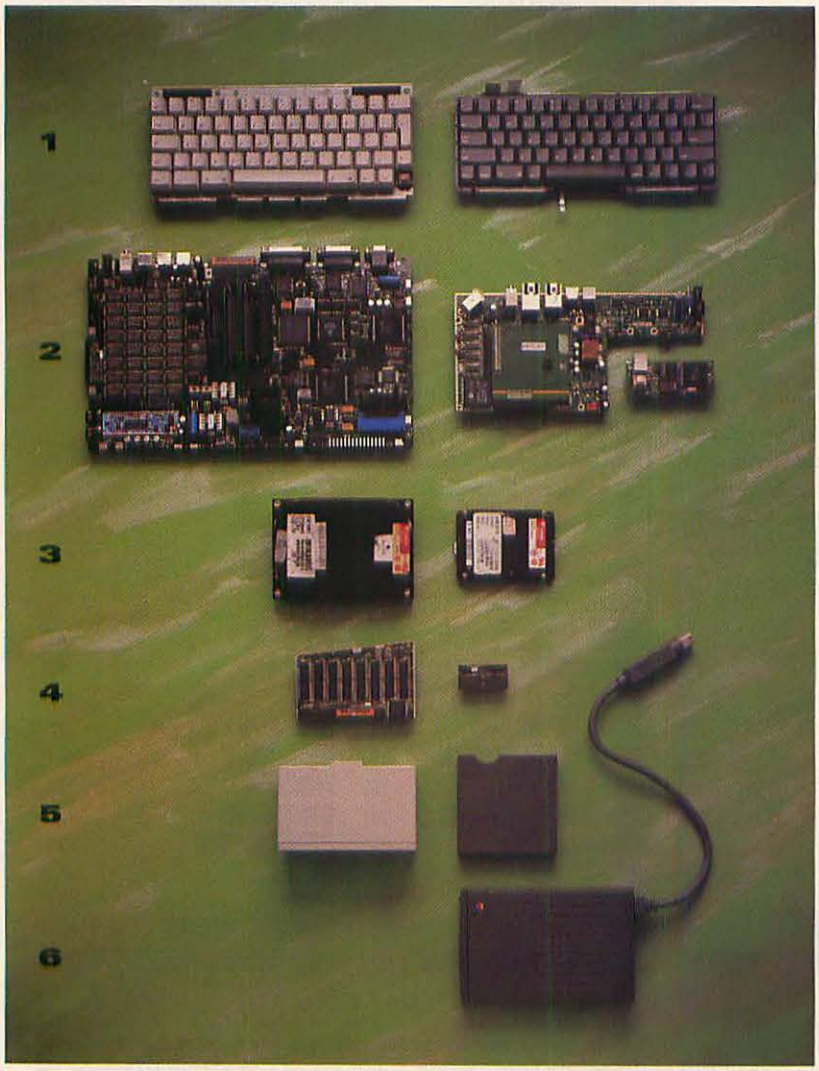
In the PowerBooks 140 and 170, you adjust brightness and contrast with a mechanical slider bar, which is more convenient than running the Portable's software DA to change these levels. The displays on the 140 and 170 measure 9.8 inches diagonally, display 640 by 400 pixels in black and white only, and are 77 dots per inch. Both use the same ROM with 32-bit QuickDraw as the new Quadra Macs do. If Apple develops a notebook with a color LCD, this ROM should support it. But in the meantime, black and white is all you get.

Apple has decided to hold the price of its notebooks despite the tariff imposed on Japanese active matrix screen displays used in the 170

Both models use 2.5-inch Conner hard drives; the 20MB drive that comes with the 140 has a 23-millisecond access-time rating; the 40MB drive with the 170, a 19ms access time. Larger-capacity drives will be offered in the new 2.5-inch size. The 140 and 170 also have internal SuperDrive floppy drives, but you must load and eject disks from the side, which is difficult in a narrow work space such as an airplane tray table. Many DOS notebooks' floppy drives load from the front to avoid this problem.

The 100-nanosecond pseudostatic memory on the 140 and 170 may be expanded to 8MB, but initially Apple will offer only 2MB expansion boards. Apple expects 4MB boards, which will bring the total memory to 6MB, to be available in early 1992. Other Macintosh memory vendors now offer expansion options to 4MB, 6MB, and 8MB. Unlike for many DOS notebooks, memory for the PowerBooks must be installed by an Apple dealer, which is especially inconvenient for businesses that have an internal support staff to maintain and upgrade equipment. This requirement also increases costs for all users because it discourages mail-order and superstore options.

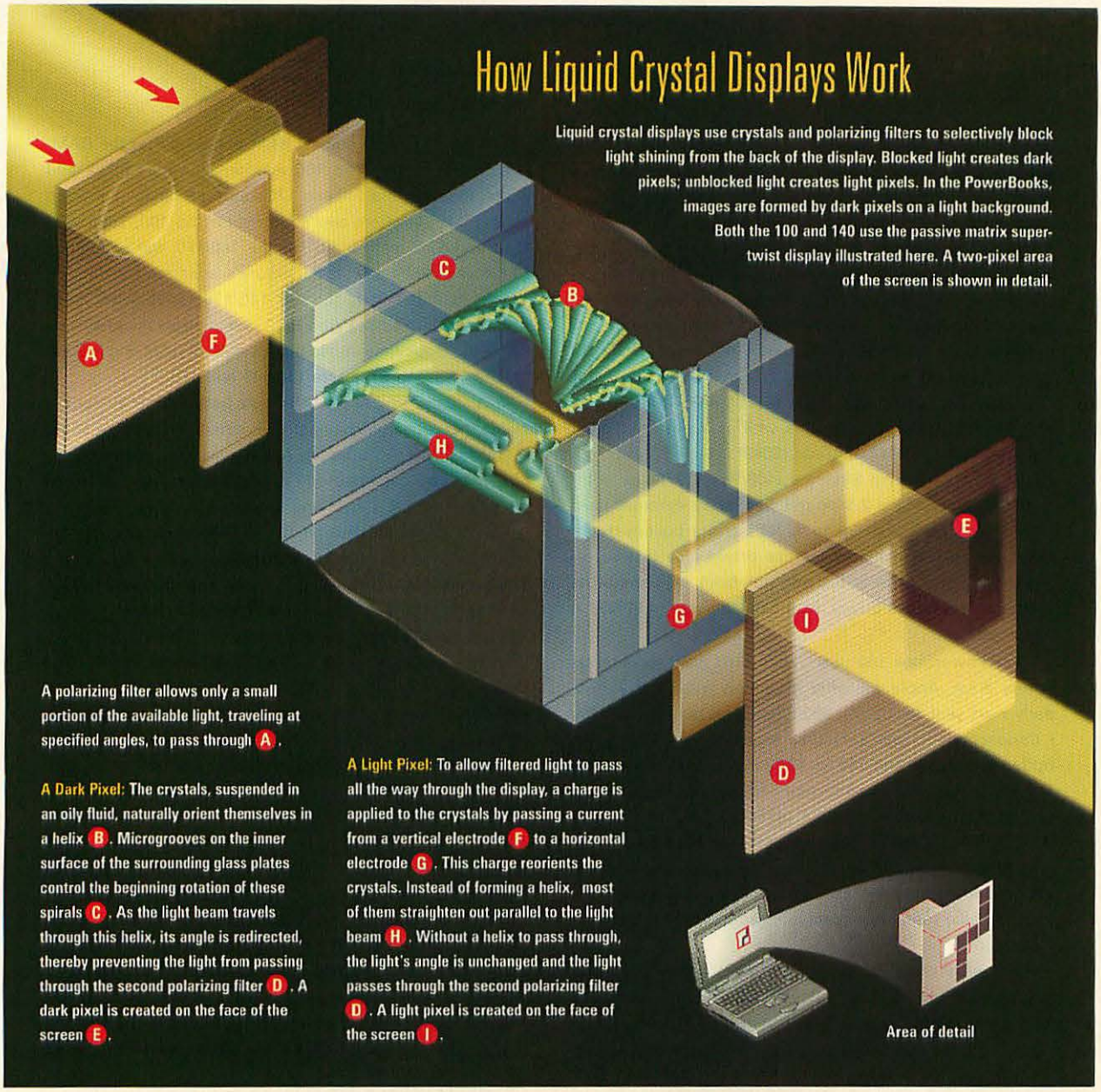
The 140 and 170 use mainstream nickel-cadmium batteries, which deliver enough power for two to three hours of constant use. (DOS notebooks using the same technology claim longer battery life because they use a special version of the Intel chip designed for laptops and have fewer special-purpose chips on their logic board.) The PowerBook uses special slim batteries developed by Apple. The advantage is a smaller, lighter battery; the disadvantage is that only Apple dealers carry them.



The Incredible Shrinking Portable Apple contracted Sony to redesign the Mac Portable's components to fit in a notebook-size case. Sony accomplished this by making the pieces smaller and lighter. Original Portable components on the left, equivalent PowerBook 100 components on the right. (1) keyboards, (2) logic boards, (3) hard drives, (4) RAM, (5) batteries, (6) external floppy.

What's the Difference?

The PowerBook 170 comes with 4MB of RAM and a 40MB hard drive for



$4600, while the 140 offers 2MB of RAM and a 20MB hard drive for $2900. Since it's pretty hard to launch more than one application under System 7 with only 2MB of RAM, the 2MB upgrade is nearly an essential part of the 140, which brings its price up to $3300 if you buy the memory from Apple. There is also a 2MB/40MB version that costs $3200 and a 4MB/40MB version that costs $3500.

The 170 has a built-in fax modem, which is a $349 option for the 140 ($399 outside of the United States). This is a 2400-bits-per-second–data/9600-bps–fax send-only modem that supports the CCITT Group 3 fax standard and the MNP Classes 4 and 5, V.42, and V.42bis error-correction and compression protocols. The Fax Sender software bundled with the 170 offers preview, cover pages, and delayed-dial options. As with memory, the modem must be installed by a dealer because Apple has provided no slide-off covers or other ways to easily access the machine's internals.

In addition to the standard battery-management features, the 170 has a power-saver option—accessed from a control panel—that slows down the CPU to 16MHz, reduces the hard drive's access rate, and dims the display's illumination. (You must restart the system after selecting this option for it to take effect.) This slowdown increases battery life by 20 to 30 minutes, Apple says.

100: Price Is the Key Factor At first glance, you might mistake a PowerBook 100 for a 140 or 170. At least until you pick it up. The 100 is 1.7 pounds lighter than its higher-powered siblings. But that's because it has no internal floppy drive—something sure to draw criticism, as the absence of a floppy drive

Options, Options

Whichever PowerBook strikes your fancy, chances are you will want more than what is provided in the basic configuration. Here's a sampling of what you can choose from.

▪ *Memory expansion* A 2MB RAM upgrade from Apple (408/996-1010) costs $399. A 4MB expansion option, which should be available in early 1992, will cost $899. Lifetime Memory Products (714/969-2421) offers 4MB and 6MB upgrade options, which cost $495 and $695, respectively. All memory expansion requires dealer installation. Computer Care (612/371-0061) offers 2MB ($629), 4MB ($1199), and 6MB ($1789) RAM upgrades, as well as a power-efficient BookRAM 4MB DRAM upgrade ($549).

▪ *Disk drives* Liberty Systems (408/983-1127) has notebook versions of its 2.5-pound 50 Series external hard drives, with capacities up to 120MB and a built-in three-hour battery and recharger; these drives also include an adapter. Liberty expects to have notebook versions of its 1.4-pound 30 Series drives, with capacities up to 60MB, in early 1992.

For PowerBook 100 users who don't want its external floppy drive, Apple will offer a version without the drive early next year for $2300, $200 less than the regular 100.

▪ *Connectivity* Apple's data/fax modem is available as an option for the 100 and 140 for $349 ($399 outside the U.S.). For those who want send-and-receive fax capabilities, Global Village Communication (415/329-0700) offers TelePort/LapFax, a $399 modem that also provides voice mail; and TelePort/Lap V.32, a 9600-bps data modem for $899. Lifetime Memories will also offer a send-and-receive fax modem. Like memory expansion, modems require dealer installation.

For easy connectivity, Apple offers a $49 SCSI disk adapter that lets you plug a PowerBook 100 into a desktop Mac and treat the notebook as if it were an external hard drive. With the 140 and 170 you must transfer information on disks (which is slow), connect to a desktop Mac via a serial cable (also slow), or connect via a network (assuming you have one).

Dayna Communications (801/531-0600) will offer the DaynaPort SCSI Ethernet connector box for $399 by the end of the year. This adapter will let you connect to Ethernet networks via the SCSI port.

▪ *Video* Radius (408/434-1010) offers the PowerView interface box, which lets you drive a color monitor or a projection device (including the AppleColor High-Resolution RGB Display and VGA-compatible displays) from any of three PowerBooks. The 4-pound PowerView will have its own AC power source and connect to the PowerBook's SCSI port.

Lapis Technologies (510/748-1600) plans to offer a SCSI-based output connector for monochrome video in the first quarter of 1992. Three companies offer video-out adapter boards with add-on RAM that plug into the RAM-expansion socket. The 100 adapters support black and white; those for the 140 and 170 support 8-bit color. Envisio (612/653-7694) offers two adapters for the 100, $695 with 1MB and $795 with 2MB. For the 140/170, the adapter is $1295 with 2MB. Lifetime Memory's adapters for the 100 are $395 with 2MB; for the 140/170, $495 with 2MB. Computer Care's BookView is $395 and offers no additional RAM; the BookView Imperial adds 4MB of RAM and is $959 for the 100, and $1189 for the 140 and 170.

▪ *Power supplies* Apple sells extra batteries for $99 and a caddy that recharges two batteries simultaneously for $159. If you lose the AC adapter, Apple sells a replacement for $99. (No, you can't use one of the $15 adapters designed for your portable stereo and calculator.)

Lind Electronic Design (612/927-6303) is offering the BC-100, an external battery charger for the PowerBook 100. The compact charger weighs 1.5 pounds and will sell for $149.95. For the truly mobile, the Automobile Power Adapter is a 12-volt DC auto lighter adapter for all three PowerBooks, it weighs less than 9 ounces and will sell for $99.95. For those extra-long airplane flights, the Auxiliary Power Pack provides power equal to approximately five of the standard PowerBook batteries. It weighs 5 pounds, and sells for $189.

▪ *Software* Dantz Software (510/849-0293) offers Intertie, a utility that handles backup and reconciles files (so that both your desktop Mac and portable have the most current copies of documents; it will be available for $149 in the fourth quarter). T/Maker (415/962-0195) is bundling a bunch of software—its WriteNow word processor, clip art for faxes, PowerUp Software's Address Book Plus 2.0 address book program, Softview/ChipSoft's Business Expense Reports automated report generator, and the America Online service—with a nylon case that holds a notebook computer and has three internal pockets for disks, one for papers and airline tickets, and an external pocket for files. The PowerBundle costs $249.95.

The Voyager Company (213/451-1383) is publishing "Expanded Books" designed for reading on the screen. The first titles, available on October 21, will be Douglas Adams's *The Hitchhiker's Guide to the Galaxy,* Michael Crichton's *Jurassic Park,* both volumes of Martin Gardner's annotated edition of *Alice in Wonderland,* and the Zagat restaurant guides to New York and San Francisco. These books will sell for $19.95 each.

▪ *Accessories* Kensington Microware (415/572-2700) is also offering nylon cases: one is a slipcase that holds just the PowerBook, not the power supply, batteries, or other peripherals; the other is bigger and holds such peripherals and personal papers. Both will be made of Cordura nylon. No price was set for the slipcase; the larger case will cost $149. Another Kensington offering is a numeric keypad, price undetermined at press time.

is now almost unheard-of for notebooks. (The external floppy drive weighs about a pound.) At 11 by 8.6 by 1.8 inches, the 100 is smaller and thinner than the other PowerBooks. This small size requires a smaller trackball than that of the 140 and 170 (25mm versus 30mm), although the keyboard is the same.

The 100 is essentially the old Mac Portable scaled down for a smaller box. The ROM is the same, the CPU is a 16MHz 68000, the floppy drive is external, and the battery is the heavier (by about 50 percent for equivalent power), lead-acid type.

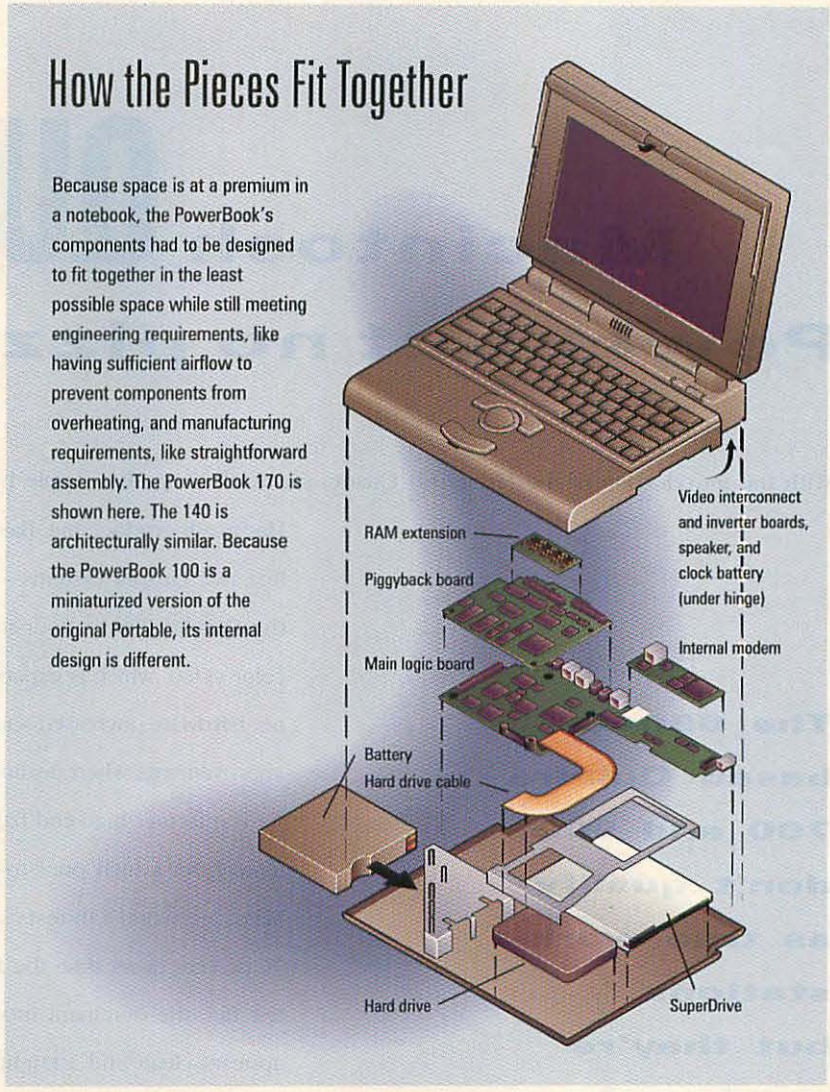
Compared to its Portable predecessor, the PowerBook 100 has a smaller-capacity drive (20MB versus 40MB) and the less-appealing but lower-cost passive matrix liquid crystal display. And although the 100 uses the same display technology as the 140, the 100's screen is smaller. Text appears smaller too, because the screen has 85-dpi instead of 77-dpi resolution. These two factors combine to make the 100's the least-appealing display of the three, fine for occasional use, but not well suited for extended work sessions.

Instead of using a slider bar to adjust brightness and contrast as the 140 and 170 do, the 100 uses a mechanical dial. The on/off, restart, and interrupt buttons are toward the back on the left side of the case, which makes it easy to press them accidentally; on the 140 and 170, they are safely on the back panel.

The 100 comes with 2MB of RAM, expandable up to 8MB, just like its siblings. The 100's casing is made of lighter, more fragile plastic instead of the more impact-resistant polycarbonate used in the other PowerBooks, contributing to its less-than-rugged feel. The 100's back-panel connection features are the same as those of the other PowerBooks, except there is only one serial port and no sound-input port (so it does not come with a microphone).

How the Pieces Fit Together

Because space is at a premium in a notebook, the PowerBook's components had to be designed to fit together in the least possible space while still meeting engineering requirements, like having sufficient airflow to prevent components from overheating, and manufacturing requirements, like straightforward assembly. The PowerBook 170 is shown here. The 140 is architecturally similar. Because the PowerBook 100 is a miniaturized version of the original Portable, its internal design is different.



Long-Awaited Reward

For loyal Macintosh users, the PowerBooks are a reward for waiting so long for the power of a Mac that can go where they go. Although the 100 is an entry-level machine, it is well suited for casual users who seek to do basic tasks like telecommunications, word processing, and straightforward presentations on the road. While the casual user can make do with the 68000 CPU in the 100, business users need the 68030 in the 140 and 170 to really take advantage of System 7. The 140 meets the needs of the business user who wants the capabilities of a desktop Mac, in a machine suitable for extended use in hotels or other sites. And the 170's math coprocessor makes the 170 a natural for spreadsheet power users, while its clear, sharp display makes it the machine of choice for anyone planning to spend a lot of hours in front of it day to day.

But no matter which notebook you buy, don't think of it as a replacement for a desktop machine. Until the PowerBooks have high-capacity built-in hard drives, and until active matrix displays are available for more than just the PowerBook 170, Macintosh notebooks just won't have the power to be an all-day, everyday substitute. Even then, ergonomics considerations and the lack of color will be enough to keep most people from adopting notebooks as their primary workstations.

Still, you no longer have to envy your DOS-toting colleagues, lug around an inferior machine, or worse, join their ranks. Notebook computing has arrived on the Mac in the form of solid, capable, and eminently usable PowerBooks. ■

See *Where to Buy* for contact information.

Macintosh QUADRAS

Power but no pizzazz

The 68040-based Quadra 700 and 900 don't qualify as true workstations, but they're quick and well priced

by Bruce F. Webster

With the introduction of the Macintosh Quadra series of computers, Apple has firmly anchored the high end of the Macintosh product line. Based on the Motorola 68040 processor, the first two Quadra systems—the Quadra 700 desktop computer and the Quadra 900 (a floor-standing tower unit)—offer built-in 8-bit color video, which is expandable to 24 bits per pixel; built-in Ethernet hardware; increased sound support; and significant performance improvements when dealing with SCSI and NuBus peripherals.

The former high-end flagship, the Macintosh IIfx, has always suffered from a high price-to-performance ratio compared with other Macs. Macworld Lab tests show that Quadra system performance is 20 percent faster than the IIfx and, more important, twice as fast as the IIci, the dominant modular Macintosh today. The architecture appears clean and straightforward, with enhancements to known bottlenecks, such those in NuBus and SCSI. And the pricing, while not radical, reflects Apple's increased aggressiveness: $5700 to $7700 list for Quadra 700 base units, and $7200 to $9200 for Quadra 900 base units. Since these prices include built-in Ethernet and 8-bit color video, each system then has a price equivalent to or lower than a comparably equipped Mac IIci or Mac IIfx, respectively.

The Tower of Power The new high-end flagship of the product line, the Quadra 900, is a box designed to stand beside, behind, or beneath a desk. (Apple plans to provide extra-long keyboard and monitor cables.) The Quadra 900 is intended to serve as a power machine, such as a network file server or a workstation. The 900 has room inside for a SuperDrive and three additional 5.25-inch half-height devices. For example, inside a single Quadra 900 you could fit a floppy drive, another removable-media storage device (for instance,

PHOTOGRAPHS BY MARK JOHANN



Designed to stand on their sides, the Quadra 900 (upper left) and Quadra 700 (lower right) are the new Macintosh high-end machines.

a CD ROM drive, a magneto-optical drive, or a tape backup drive), and two hard drives.

To drive all this, the Quadra 900 comes with an autoconfiguring 300-watt power supply, which accepts input line voltage from 100V to 240V AC and a frequency range of 50Hz to 60Hz. The power supply produces 300w of internal power, sufficient to drive a full set of SCSI devices and NuBus boards.

As a new twist, the Quadra 900 comes with a key-and-lock control for power and access. There are three settings: off, on, and secure. The off setting prevents the system from being powered up. The on setting makes the 900 act like a regular Mac: the power-up key turns it on and the Shut Down command turns it off. The secure setting disables both the ADB port (preventing keyboard and mouse input) and the floppy disk drive (preventing floppy disk mounting or access). In the secure setting, even if someone pulls the plug, inserts a bootable disk, then plugs the Quadra 900 back in, it ignores the disk and boots internally. If there is a power failure while the Quadra 900 is in secure mode, once the power comes back on, the Quadra 900 automatically reboots and launches whatever application has been previously selected using the Set Startup command.

Macworld Lab tests show that Quadra system performance is 20 percent faster than the IIfx and, more important, twice as fast as the IIci, the dominant modular Macintosh today

Desktop 040 The Macintosh Quadra 700 looks very much like the Mac IIci and IIcx, except that—like the 900—the 700 is designed to stand upright. It has nearly the same performance characteristics as the Quadra 900, but not the expandability. The 700 accommodates just two 3.5-inch one-third-height storage devices and has only two slots, less memory expansion than the 900, a smaller (75w) power supply, and no key-lock control. On the other hand, the 700 is smaller, lighter, and cheaper than the Quadra 900, and the Quadra 700 fits on a desktop. If you don't want the 700 to stand upright, you can pop off its "beer can" feet and pop on the included IIci-style "flat" feet.

Apple will offer a relatively inexpensive 68040 upgrade for Mac IIcx and IIci owners. The upgrade will replace just about everything but the mass storage and the snap-off lid and will list for about $3500. Unfortunately, the upgrade won't be available until sometime next year.

Architecture in Common The Quadra series uses a 25MHz Motorola 68040 processor. This chip is binary-compatible with the earlier 680X0 processors and incorporates both a limited memory management unit (MMU) for running virtual memory and a subset of the arithmetic algorithms generally found in a floating-point unit (FPU). However, the 68040 offers this power at a price: some software applications will be incompatible because of the way the 68040 handles data and instruction caches (see "Growing Pains in the 68000 Family"). In fact, Apple had to modify System 7 and A/UX to run on the Quadra series. (The Quadra systems will come with System 7.0.1 and HyperCard; A/UX 3.0, which will run on the Quadras, will be released in the first quarter of 1992.)

The main logic board architecture is divided into two buses: system and I/O. The system bus, running at 25MHz, connects directly to the 68040 CPU bus lines. Devices on the system bus include main memory, video memory, video circuitry, the NuBus controller, and the SCSI controller. This connection allows for high performance in each of these areas.

A Processor Direct Slot (PDS) also attaches directly to the system bus. This slot can be used by boards that either need to replace the 68040 CPU or need to have direct access to it and the other devices on the system bus. Such boards might include accelerators, coprocessors, or high-performance display devices.

The I/O bus, running at 16MHz, drives all ports, such as serial, ADB, audio I/O, floppy drive, and Ethernet. The I/O bus uses the same architecture and clock speed as existing Macintoshes. And although it is no faster, the I/O bus maintains compatibility with current peripherals and helps keep the Quadras' cost down, since no new technology had to be developed.

Both Quadra systems come with 4MB of RAM for main memory. For the Quadra 700, the memory is soldered onto the main logic board; four additional memory sockets accept 80-nanosecond SIMMs, either in 1MB or 4MB sizes, allowing expansion up to 20MB. The Quadra 900 has 12 memory-expansion sockets, allowing it to hold up to 64MB of RAM using 4MB SIMMs.

Both systems also include 1MB of ROM, which is mounted directly on the logic board. This is up from the 512K of ROM found on last year's release of Macintosh products and is a long way from the 64K of ROM found on the original Macintosh. The Quadra prototypes that Apple showed *Macworld* also each had a SIMM socket for ROM; Apple indicated that the socket might remain on the final products for easy upgrading.

There's little to complain about with the basic design. The choice of the 68040 was an obvious one; ample provisions have been made for expanding both main memory and ROM; and the dual-bus system is a good compromise between performance and backward compatibility. Some components previously on the I/O bus have been moved to the system bus for increased performance; other components that were not creating a bottleneck have been left on the I/O bus and maintain compatibility.

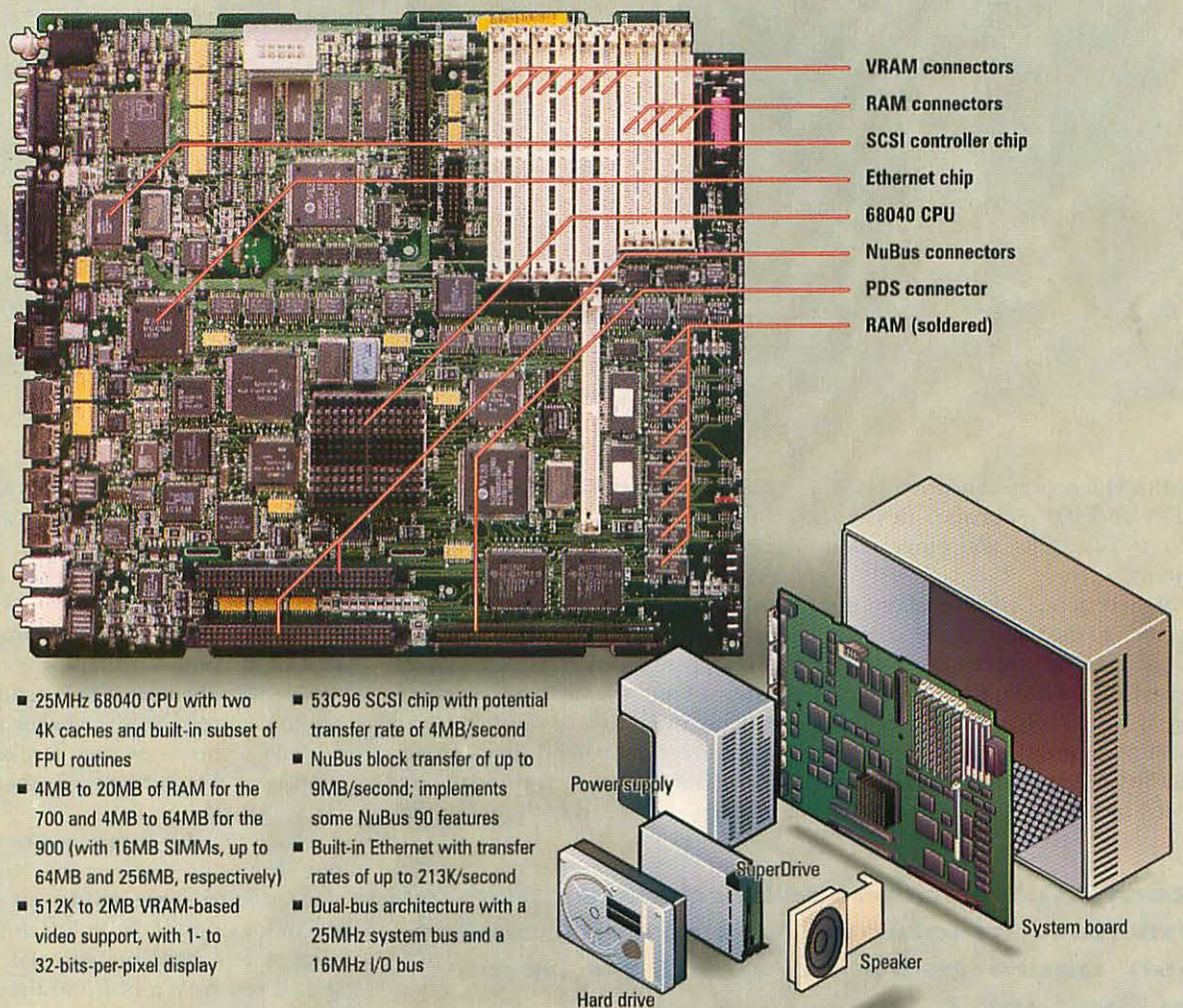
Monitor Options The Quadra systems come with separate video memory and built-in video circuitry capable of driving Apple's full line of monochrome and color monitors. ("Quadra Video Options" shows the resolution and pixel depth available on

the various monitors.) The 700 comes with 0.5MB of video RAM (VRAM), while the 900 comes with 1MB. Like the Macintosh LC—and unlike the Mac IIci—this VRAM is separate from main memory. This avoids the access conflicts and resulting performance problems the IIci had when the on-board video was used.

Apple claims that because of direct CPU access to video memory and the higher performance of the 68040, the on-board video runs at about 80 percent of the speed of Apple's accelerated Macintosh 8•24 GC video board. Potentially, on-board video can be accelerated further via a PDS-based board that could offload graphics operations from the CPU. NuBus graphics accelerators will be able to improve performance speed by taking advantage of the Quadras' burst-mode capabilities.

The Quadras' video circuitry is capable of driving many non-Apple monitors. These include not only Mac-compatible monitors from vendors such as Radius, SuperMac, and RasterOps, but also IBM PC–style VGA (Video Graphics Array) and XGA (Extended Graphics Array) monitors. Furthermore, with the same adapters used by the 8•24 GC board, the

Why Are the Quadras Faster?



- 25MHz 68040 CPU with two 4K caches and built-in subset of FPU routines
- 4MB to 20MB of RAM for the 700 and 4MB to 64MB for the 900 (with 16MB SIMMs, up to 64MB and 256MB, respectively)
- 512K to 2MB VRAM-based video support, with 1- to 32-bits-per-pixel display
- 53C96 SCSI chip with potential transfer rate of 4MB/second
- NuBus block transfer of up to 9MB/second; implements some NuBus 90 features
- Built-in Ethernet with transfer rates of up to 213K/second
- Dual-bus architecture with a 25MHz system bus and a 16MHz I/O bus

Keeping Up with Transfer Rates

All times are in seconds.

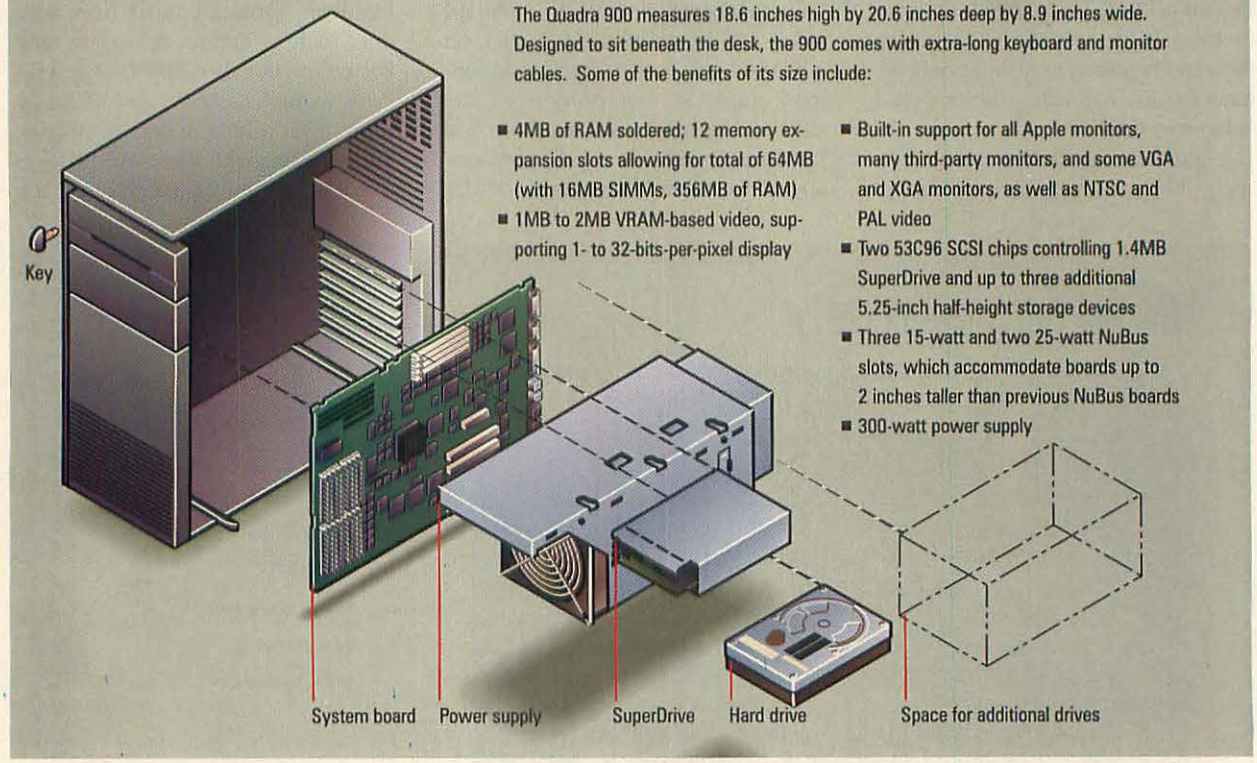
The Quadras' new SCSI technology reportedly supports transfer rates of up to 4MB per second, which is much faster than hard drives currently available. Apple's new 400MB drives tested at 2MB per second, while 80MB drives tested at 0.7MB per second.

	Duplicate 10MB folder	Duplicate 3.2MB folder	Open Photoshop file	Save Photoshop file
Apple 80MB drive	92.1	26.9	17.4	17.8
Apple 400MB drive	61.8	16.6	13.4	8.0

Size Benefits of the Quadra 900

The Quadra 900 measures 18.6 inches high by 20.6 inches deep by 8.9 inches wide. Designed to sit beneath the desk, the 900 comes with extra-long keyboard and monitor cables. Some of the benefits of its size include:

- 4MB of RAM soldered; 12 memory expansion slots allowing for total of 64MB (with 16MB SIMMs, 356MB of RAM)
- 1MB to 2MB VRAM-based video, supporting 1- to 32-bits-per-pixel display
- Built-in support for all Apple monitors, many third-party monitors, and some VGA and XGA monitors, as well as NTSC and PAL video
- Two 53C96 SCSI chips controlling 1.4MB SuperDrive and up to three additional 5.25-inch half-height storage devices
- Three 15-watt and two 25-watt NuBus slots, which accommodate boards up to 2 inches taller than previous NuBus boards
- 300-watt power supply



Quadra video port can drive NTSC (USA) and PAL (Europe) devices, such as TVs, VCRs, and other video systems.

If there is one criticism about the approach to the Quadras' video architecture, it is that Apple has never addressed on a system level the single biggest bottleneck remaining in Macintosh performance: graphics rendering. The CPU must still draw each pixel (be it 1 bit deep or 24 bits deep) that appears on the screen. Furthermore, the Quadra series has no I/O processor to help blast graphic bitmaps from main memory to VRAM; the CPU must copy over each and every bit. Given the move toward large screens and deep color, this bottleneck becomes ever more significant.

Expansion Options For the Quadra series, Apple dropped the failed attempt at direct memory access it made on the Mac IIfx and instead went with a faster SCSI controller chip (the 53C96). Apple claims that this chip supports SCSI data-transfer rates of up to 4MB per second, roughly twice that of the IIfx. Given the current access and transfer rates for all but the fastest hard drives, the Quadras' transfer rate should be sufficient (if not faster than necessary) performance for some time to come.

System 7.0.1 addresses hardware changes in the new machines and previous Macintosh users have no need to upgrade from System 7

The Quadra 700 has an internal and an external SCSI port, both driven by the same controller chip. As usual, the SCSI circuitry supports up to seven devices such as hard drives, CD ROMs, and scanners. The Quadra 900 adds a second SCSI controller chip and internal port to minimize problems with daisy-chaining internal devices. Still, the Quadra 900 can support only seven SCSI devices.

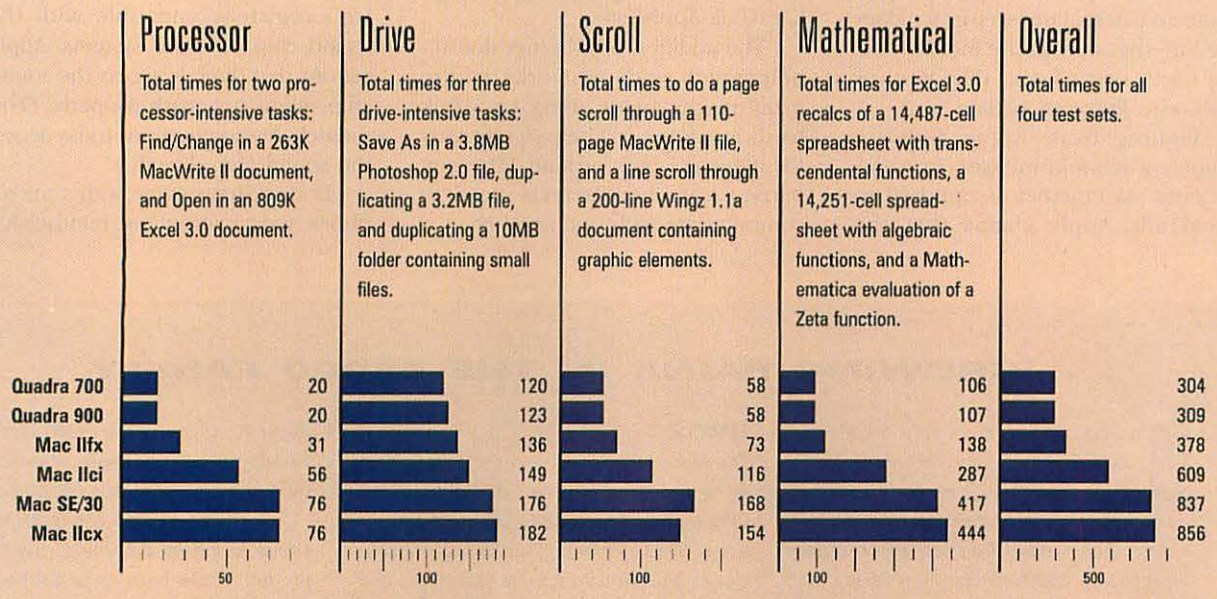
One other interesting point: the new SCSI controller chips are compatible with the new SCSI-2 standard. Apple's current SCSI Manager software hasn't been rewritten to take advantage of this, however, so there is no SCSI-2 support yet.

Each Quadra system comes with one PDS slot and several NuBus slots. Due to space and layout considerations, one of the NuBus slots on each system lines up with the PDS slot. If you have a board in the PDS slot, you can't use that NuBus slot, and vice versa.

The Quadra 700 has two NuBus slots and a power supply that provides 15w to each of them. The Quadra 900 has five NuBus slots and provides 15w to three of them and 25w to the other two. Also, the Quadra 900 system allows NuBus (and PDS) boards to be up to 2 inches higher than the cur-

MW LAB Quadras' Performance Compared

All times are in seconds.



In all the performance tests, the new Quadras ran faster than any previous Macintosh, although the IIfx ran a close second in most tests. See "Why Are the Quadras Faster?" for even faster Quadra speed when using Apple's new 400MB drives with enhanced transfer rates.

rent height limit for existing modular Macs. This allows for larger and more-complex boards (within power constraints, of course), packing more functionality into a single board.

Apple has improved NuBus performance, relieving some of the bottlenecks that have plagued other Macs. First, the NuBus controller is now attached to the 25MHz system bus, instead of to the slower I/O bus as it was in the Mac IIfx. This allows more-direct and faster access to the CPU, main memory, and VRAM. Second, when the 68040 wants to transfer data from main memory to a given NuBus board, the 68040 just gives the NuBus board the necessary details, then goes on to other tasks. The CPU doesn't have to wait until the data transfer is over to continue execution. Third, NuBus boards, which are set up to be NuBus masters (that is, they can initiate and control data moves), can now perform bidirectional block transfers between themselves and main system memory, at a transfer rate of up to 9MB per second.

QUADRA VIDEO OPTIONS

	Resolution in pixels (hor. × vert.)	Bits per pixel with: 0.5 MB of VRAM	1MB of VRAM*	2MB of VRAM
Apple Macintosh 12" RGB Display	512 × 384	8	8	24
Apple High-Resolution Monochrome Monitor	640 × 480	8	8	8
AppleColor High-Resolution RGB Monitor	640 × 480	8	8	24
Apple Macintosh Portrait Display	640 × 870	4	8	8
Any Third-Party 16" RGB Monitor	832 × 624	4	8	24
Any Third-Party 19" RGB Monitor	1024 × 768	4	8	8
Apple Two-Page Monochrome Monitor	1152 × 870	4	8	8
Macintosh 21" Color Display	1152 × 870	4	8	8

** If the Quadra has 1.5MB of VRAM, the monitor will have the same pixel depth as it does with 1MB of VRAM.*

Finally, Apple has started to implement some of the features of the still-evolving NuBus 90 specification, such as the 2× clock signal, which allows for burst transfers between NuBus boards at double the normal rate, giving a theoretical maximum transfer speed of nearly 80MB per second between boards. You won't see that sort of speed unless someone develops a board to support it, but at long last, the option is there.

Given the built-in video and Ethernet, the number of slots for each system is adequate, while the enhancements to NuBus operation should allow third-party hardware developers to create boards that are more complex. And with the move toward SCSI-2 and NuBus 90, Apple has room to grow.

Faster Networking In addition to AppleTalk support via the

serial ports, both Quadra systems come with built-in Ethernet circuitry. The Ethernet port uses the same 15-pin setup found on Apple's Ethernet boards. However, the user must purchase an external transceiver to adapt the Ethernet port to the medium being used: twisted-pair, thin-wire, or thick-wire Ethernet cabling.

Figures from Apple indicate roughly a ten-fold increase in transfer rates via Ethernet as opposed to LocalTalk. Apple claims that the Ethernet circuitry on the Quadra systems transfers data at speeds of up to 213K per second using EtherTalk protocols, compared with rates of about 20K to 22K per second for LocalTalk/AppleTalk.

The addition of Ethernet doesn't help much with networks where many machines are using LocalTalk hardware. But it will help significantly for networks built around Ethernet, particularly where servers need to communicate with one another.

Sound and Ports The Quadra series comes with another custom stereo sound chip—a superset of the chip in the Mac IIsi and LC. The chip doesn't support wave tables and isn't register-compatible with the sound chip on older systems. Applications that directly access the sound chip might not work properly. (Fortunately, few applications today access the sound chip directly.)

Both systems come with a microphone and a microphone minijack for

GROWING PAINS IN THE 68000 FAMILY

Macintosh computers rely on Motorola's 68000 family of central processing units (CPUs) for shuffling data and for interpreting and executing instructions (codes that tell a computer what to do). With each iteration—from the 68000 to the newly introduced 68040—the CPU includes more functionality while becoming smaller and more streamlined. The transition has been smooth for the most part, but incompatibilities sometimes arise in applications that fail to follow Apple's development guidelines.

68000

Motorola's 68000 CPU controls the Macintosh 128K, 512K, 512KE, Plus, SE, Classic, and Portable. Apple chose the 68000 chip because of its high performance and elegant instruction set. The early Macs did not come with a floating-point unit (FPU)—a coprocessor that performs calculations on numbers with decimal points—or a paged-memory management unit (PMMU), which is necessary for virtual memory operations.

68020

The Macintosh II, which runs twice as fast as its predecessors, comes with a 68020 CPU along with a 68881 FPU and an optional 68851 PMMU. The 68020 chip includes an instruction cache that stores 256 bytes of the most recently fetched instruction code. The cache enhances speed for repetitive tasks because the CPU doesn't have to go out to main memory to find the address and contents for instructions that already reside in the cache.

This 68020 caching causes problems for applications that make changes to code residing in memory (Apple specifically warns against this practice, called self-modifying code). If it finds a particular instruction in the cache, the 68020 looks no further, and any changes to that code in main memory go unnoticed. Developers of offending software have had to offer upgrades.

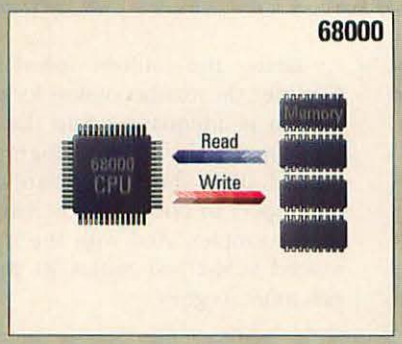
68030

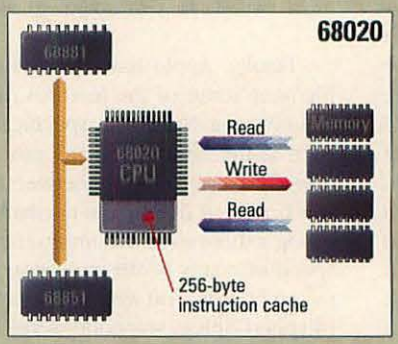
With the Macintosh IIx, Apple first used the 68030 CPU, which incorporates most of the functions of the 68851 PMMU chip. Floating-point operations are still handled by a separate chip, the 68882 FPU.

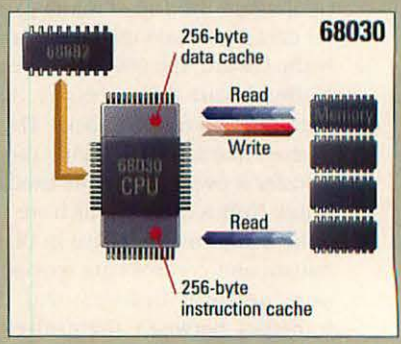
In addition to the 256-byte instruction cache found on the 68020, the 68030 includes a 256-byte data cache, further speeding up repetitive tasks. The data cache on the 68030 operates in *write-through* mode: when a new data value is written to an address found in the cache, both the cache and memory are updated. Few incompatibilities are encountered.

68040

The Quadra series uses the 68040 CPU, which incorporates subsets of both FPU and PMMU functionality on a tiny—1.5 cm by 1.5 cm—chip made up of more than 1.2 million transistors; that's four times the number found on the 68030 and six times the number on the 68020. Because the chip draws 5 watts of power—more than the entire PowerBook 140 draws even with its display and disk drive running—the chip requires a many-pronged hat, called a heat sink, to dissipate heat.







sound input; the Quadra 900 also comes with dual line-ins and with an internal adapter for bringing music directly off an internal CD ROM drive. In all cases, the signals brought in are mixed down to monaural. The sound-input circuitry samples in 8-bit resolution at rates of 11.1KHz or 22.2KHz.

For output, both systems have an internal speaker—a fairly big one in the Quadra 900, with its own amplifier—and a stereo-output minijack. The Quadra 900 has a direct connection from the CD ROM internal adapter to the stereo-output minijack, allowing sounds from a CD ROM to output in stereo.

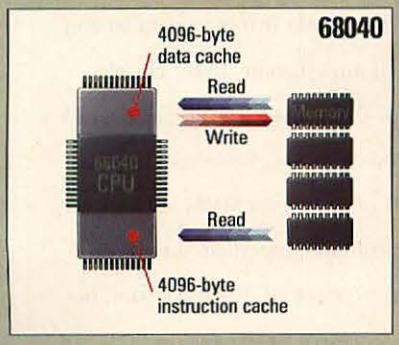
The Quadra systems come with the usual set of Macintosh I/O ports. Both the 700 and the 900 have two RS-422 serial ports, typically used for modems, printers, and AppleTalk networking. The Quadra 700 has two ADB ports, and the Quadra 900 has one for the keyboard, mouse, and similar devices.

The 68040 employs a high degree of *pipelining*—the process of decoding and carrying out several instructions simultaneously. An instruction pipeline works a bit like an assembly line. Each station works on its special portion of the instruction. When a particular station has finished disassembling and carrying out its portion of an instruction, that station is free to work on the next instruction without waiting for the other stations down the line to finish with the current one.

Incorporating FPU functions into the 68040 has a price. Because the 68040's built-in floating-point operations do not include the transcendental (trigonometric, exponential, logarithmic, and hyperbolic) functions found on the 68882, Apple includes software algorithms for these functions in ROM. The CPU handles simple math operations, executing them up to ten times faster than the 68030/68882 combination at the same clock speed. Transcendental functions, which must be handled by software, execute at speeds comparable to a 33Mhz 68882.

The data and instruction caches on the 68040 are each a whopping 4096 bytes. The 68040's caches can operate in *copy-back* mode: when data is written to an address found in the cache, only the cache is updated. Main memory is updated only when the data cache is specifically told to flush its contents to memory. Copy-back mode minimizes the delays associated with writing to memory, but once again, it wreaks havoc with applications that do not follow Apple's guidelines. If an application treats instructions as data, either through self-modifying or relocated code, and looks directly to main memory for valid instructions, it does not know that the modified or relocated instruction is waiting in the data cache; the CPU loads and tries to execute old values stored at the designated addresses in main memory.

Because Apple disapproves of the practices that lead to incompatibilities with the 68040, the company will not provide an option to revert to write-through mode in order to avoid incompatibilities. For the first few months at least, Apple will ship a control panel device (cdev) that allows users to disable the caches altogether, however. To detect compatibility problems, Apple is circulating 150 Quadra prototypes among developers and is also providing a room full of Quadra systems at Apple that developers can use to test their products. Apple plans to pack a list of compatible software and hardware products with each Quadra system. Most applications will probably be upgraded to run with the 68040 within the first six months, but third-party developers will no doubt announce cdevs similar to Apple's that will let users revert to write-through mode or disable the cache at will.



Is This the Power Machine We Want? While the Quadra series isn't a great technological leap forward, it represents a solid evolutionary advance. The architecture is clean and solid, most of the bottlenecks have been addressed, and there are none of the cute tricks that have marked (and marred) past hardware efforts. In short, it's about as good a solution as Apple could produce, given both the software and the hardware constraints in place. Lower prices would make these systems even better, but given the pummeling Apple has taken for thin profit margins during the past year, such a move is unlikely.

Users most likely to benefit from the Quadra series are those who find current Macintosh performance inadequate: engineers, scientists, designers, and developers. Network administrators will welcome the performance, capacity, and security features of the Quadra 900 tower, while desktop Macintosh users will welcome the extra speed and compact size of the Quadra 700.

The real advance is not just the hardware—it's the price. Apple plans to sell the Quadra 700 with 4MB of RAM and a floppy drive for $5700. Add an 80MB hard drive for a total cost of $6400; a 160MB drive for $7000; and a very fast 400MB drive for $7700. The Quadra 900 with 4MB of RAM and a floppy will run $7200. With a 160MB hard drive, it will cost $8500; and with the whopping 400MB drive, it will be $9200. Apple is showing its commitment to be competitive at the high end as well as the low end. The price is still a bit high compared with equivalent platforms from other manufacturers, but the available base of Macintosh software may well be worth that premium. Apple is betting that it is. Apple's probably right. ■

See *Where to Buy* for contact information.

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Macintosh CLASSIC II

Improving on a theme

The new Macintosh Classic II is all about performance. With a 68030 processor running at a 16MHz clock speed, this computer is twice as fast as the year-old Classic, yet costs only $400 more. The new machine also betters the old by taking full advantage of System 7 (including virtual memory and 32-bit addressing), accommodating more RAM, and incorporating sound input. Unfortunately, the Classic II continues some of the old Classic's most frustrating drawbacks; it lacks an expansion slot and offers only monophonic sound output and a monochrome display.

The new Classic II leaps ahead of its predecessor, but it's no SE/30

A Classic II with 2MB of RAM and a 40MB hard drive retails for $1899. The only other configuration, 4MB of RAM and an 80MB hard drive, retails for $2399 and permits use of the Classic II as a server for the new AppleShare 3.0 file-sharing system (see "Share and Share Alike," *Macworld News,* in this issue). Envious Classic owners can upgrade (including 2MB of RAM) for $699, beginning early in 1992.

Computing Power Although faster than its namesake, the Classic II runs a good 30 percent slower in typical daily work—such as word processing and basic spreadsheet manipulations—than the SE/30, which also uses a 16MHz 68030 (see "Macintosh Classic II Performance"). That's because the SE/30's 68030 moves data to and from memory 32 bits at a time, whereas the Classic II has a 32-bit data path only to its built-in ROM. The Classic II moves data to and from RAM and the expansion ROM (if any) in only 16-bit chunks.

The 68030 drives a new logic board that is the same size as the old Classic's logic board. The similarity ends with size, however. The Classic II board adds 512K of ROM, 2MB of RAM, two SIMM sockets for RAM expansion, and a handful of custom integrated-circuit chips.

The Classic II lacks a general-purpose internal expansion slot, but it has a slot for adding a numeric coprocessor or expansion ROM. At

by Lon Poole

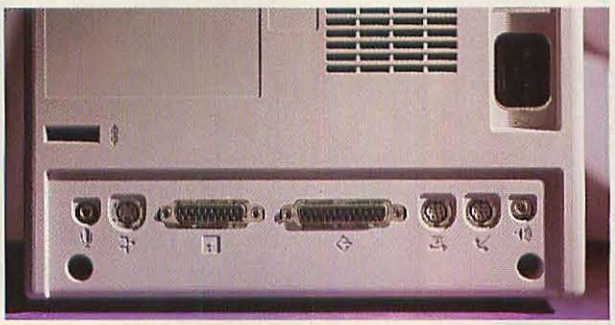
PHOTOGRAPHS BY MARK JOHANN


File Edit View Element Type Attributes
Hard Drive
Macintosh Classic II

press time, third-party developers announced plans to release products that take advantage of that slot. Newer Technologies and Lifetime Memory Products will provide floating-point-unit boards ($195 each). The latter company's product will include a ROM connector, so that it does not monopolize the ROM slot. Ironically, you can add an external monitor to an old Classic (also slotless) by clipping an adapter onto its 68000 processor. Reliable clip-on adapters are not available for the 68030 because its pins are too close together. But in an emergency you can use the pricey ScuzzyGraph adapter ($695) from Aura Systems to plug an external monochrome monitor into the SCSI port (Aura is working on a 256-color version). Envision has also announced VideoSimms ($595)—two boards with 2MB of RAM and video circuitry to control 15-inch, 19-inch, or 21-inch high-resolution monochrome monitors—that snap into the SIMM sockets. And Radius has announced PowerView, an external display interface that can control color displays through the SCSI port.

There are also SCSI adapters for Ethernet such as Compatible Systems' Ether+ ($495) and Nuvotech's NuvoLink SC ($549), and by the time this appears, Dayna Communications should be shipping the DaynaPort-SCSI ($399), an external Ethernet connector box.

Thanks to the 68030 processor and improved ROM, the Classic II's RAM can rise to 10MB—well beyond the old Classic's 4MB limit—and the Classic II can take advantage of System 7's *virtual memory*. Unfortunately the Classic II cannot use 16MB SIMMs, which would let you boost its RAM to 34MB, but the new ROM lets you make use of more than 8MB of RAM (and more than 14MB of virtual memory) by turning on System 7's 32-bit addressing.



The back panel of the Macintosh Classic II includes (from left) a microphone jack; an ADB connector; a floppy drive port; a SCSI port; two serial ports; and a two-channel monophonic headphone jack.

The improved ROM also contains 32-bit QuickDraw, which automatically displays color images in simulated shades of gray (using patterns of black dots and white dots) for the Classic II screen. This means the Classic II, unlike the Classic, will be able to play QuickTime movies and animations when Apple releases QuickTime, probably by the end of this year (see "QuickTime in Motion," *Macworld*, September 1991). Some color movies can be displayed adequately in simulated grays, but QuickTime's main value on the Classic II will be to play black-and-white animations.

QuickTime would have more value on a Classic II if the machine had true gray-scale capability. Gray scale would also let you see System 7's color icons, windows, and menus in shades of gray; create and edit gray-scale artwork; retouch black-and-white photos; and more easily use tints, screens, and gray-scale art for desktop publishing. If any of those are essential to your work, look to a more expensive Mac.

According to Apple, gray-scale capability would not have raised the price of a Classic II by much. The Classic II ROM contains all the necessary information to display shades of gray (or color, for that matter). So where's the rub? The analog circuit board, which contains the video circuitry and power supply, is geared for black and white only. Redesigning the analog board would have delayed the Classic II's introduction at a time when Apple urgently needed an inexpensive machine with enough power for System 7. And a redesigned analog board would have

Why It's No SE/30

Although the Classic II has the same 68030 processor as the nearly-three-year-old SE/30, the new machine is no match for the old. The faster SE/30 offers greater RAM capacity, an expansion slot, stereo sound, and a universal power supply. The Classic II has only four advantages: 32-bit addressing and 32-bit QuickDraw (both in ROM); sound input; and most important, it costs 44 percent less.

The question: why didn't Apple simply update the SE/30's ROM, add a microphone, and lower its price? The answer: marketing strategy. Two of Apple's goals for the Classic II made a simple SE/30 upgrade unworkable. First, the Classic II had to be inexpensive. The SE/30 was designed for maximum performance, not low cost.

Apple also wanted an easy upgrade path from a Classic to a Classic II. Although the SE/30 and Classic cabinets are the same size, inside they're totally different. An SE/30 logic board, nearly twice the size of a Classic logic board, would collide with the Classic's cooling fan. So Apple engineers had to design a new logic board for the Classic II. Finally, Apple wanted to bring the new Macintosh to market quickly. The Classic needed immediate modernization to make it a viable System 7 machine.

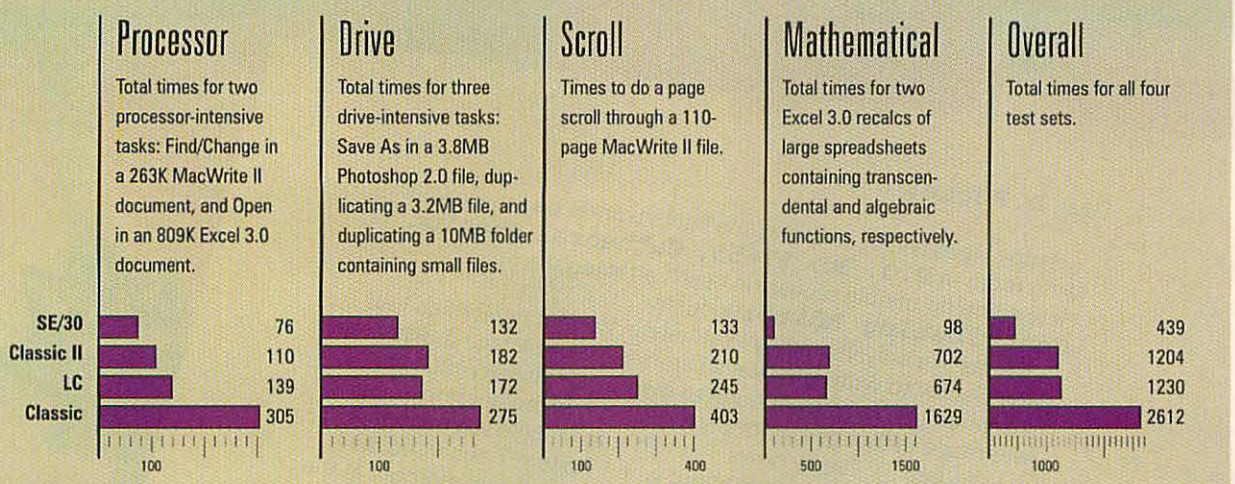
To minimize development time, the engineers adopted and adapted chips from the Mac LC. (Modifying chips from the SE/30 would have cost much more.) Standard LC chips control all the Classic II's back-panel ports. The LC's ROM and ASIC (Application Specific Integrated Circuit) chips required alterations to handle the Classic II's small monochrome monitor and the 68030's integral Paged Memory Management Unit, on which virtual memory relies. Revising the ASIC and ROM took far less time than engineering brand new chips would have taken.

To save even more development time, Classic II engineers retained the LC's speed-sapping 16-bit data path between the 68030 and RAM. A 32-bit path would have required revising the LC's ASIC as well as routing twice as many data lines on the logic board, which would have exacerbated the already difficult task of fitting everything onto a Classic-size logic board. Similar size constraints stopped Apple from equipping the Classic II with an expansion slot and a numeric coprocessor.

View the Classic II as a repackaged LC—not a modified SE/30—to understand its limitations. Without those limitations, the Classic II would not be available now, it would have cost more when it came to market, and there would have been no Classic upgrade.

Macintosh Classic II Performance

All times are in seconds.



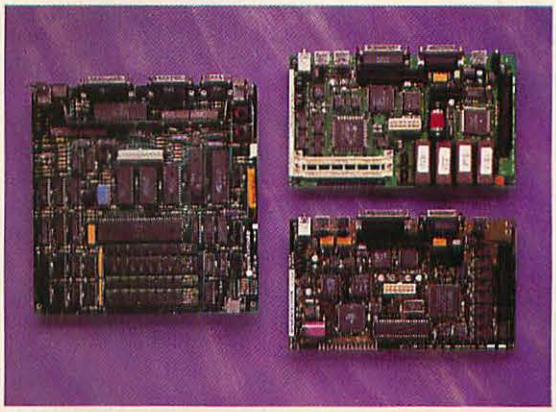
significantly increased the cost of upgrading an old Classic.

Standard Equipment At a glance, the new machine looks almost identical to a Classic. The only external change is a microphone jack on the back panel and a standard Apple microphone. The internal floppy drive works with 1.4MB, 800K, and 400K Macintosh disks, as well as their MS-DOS, OS/2, and ProDOS counterparts. The Classic II also ships with an internal, 40MB or 80MB, low-profile, 3½-inch hard drive. The factory installs System 7.0.1 on the hard drive; the Classic II does not work with any earlier version of system software.

Apple supplies the Classic II with the same keyboard and power supply introduced last year for the Classic. But unlike the power supplies in most other desktop Macs, which automatically adjust to any AC voltage in the world, the Classic II's supply works only with the voltage of the country in which it is sold. To plug a U.S. Classic II into 240-volt power, you need a good-quality, 100-watt, grounded, isolation step-down transformer (see *Quick Tips,* July 1991).

Value Holding down the cost of upgrading a Classic was a primary concern for the Classic II design. The upgrade from a Classic with a hard drive is a good value at $699 plus minimal installation costs. If you do not already use System 7, however, you may also have to upgrade software (see *Quick Tips,* in this issue).

The upgrade path looks less appealing for owners of Classics equipped with only floppy drives. An internal hard drive costs at least $250, so the total cost associated with upgrading to a Classic II running under System 7 could easily top $1000. (Apple continues to offer an SE to SE/30 upgrade for $999, but the company offers no upgrade path for the Mac Plus.)



The Classic II logic board (right, top) fits in exactly the same space as the original Classic logic board (right, bottom), but the new logic board's capabilities more closely resemble those of the much larger and faster SE/30 logic board (left).

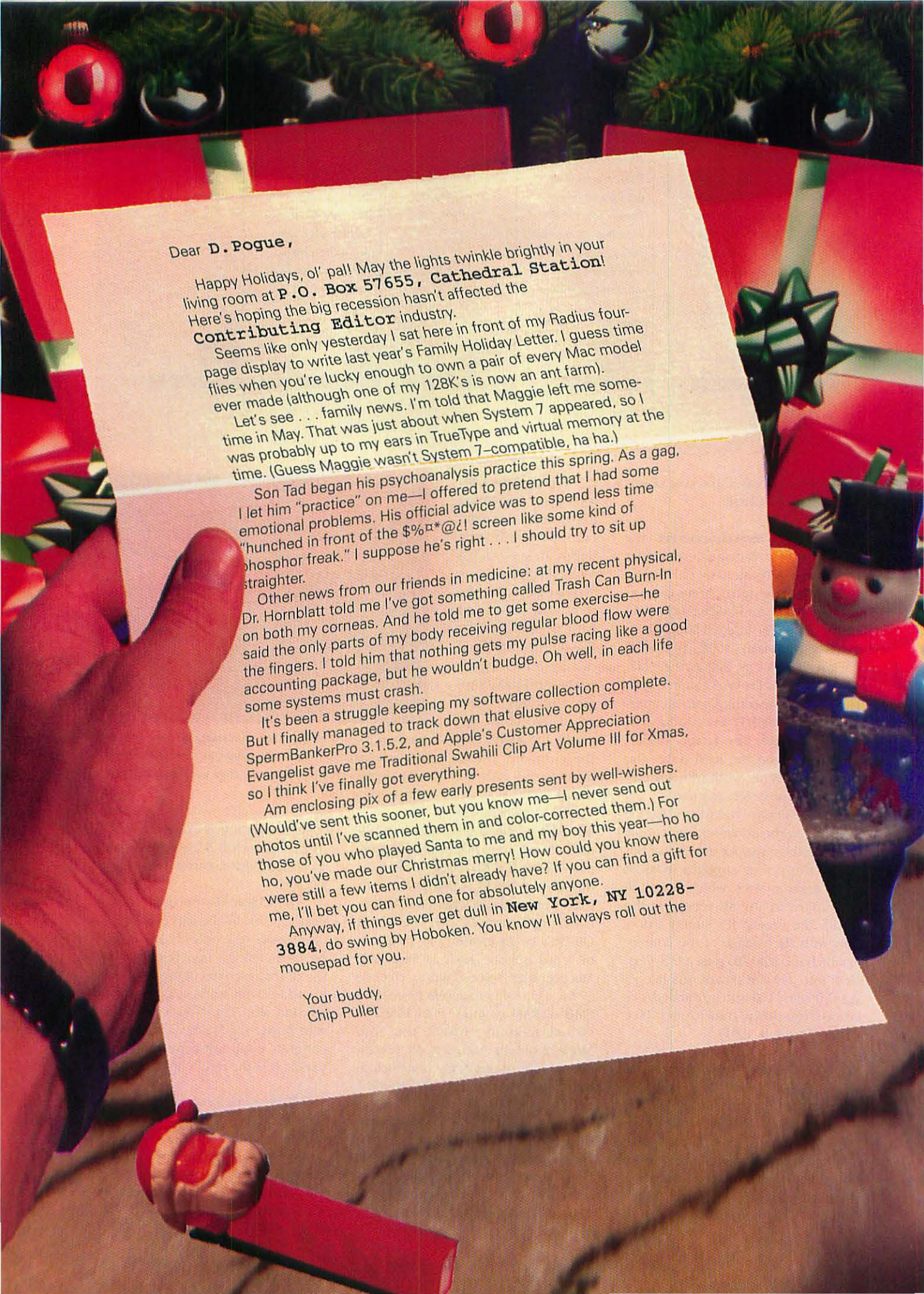
SE/30 owners will not want a Classic II because they already own a more powerful computer (see "Why It's No SE/30"). And although the SE/30 is somewhat outdated, this can easily be remedied by installing System 7 with the 32-bit QuickDraw extension and plugging in a microphone such as Farallon's MacRecorder Voice Digitizer. To use 32-bit addressing to access more than 8MB of RAM or more than 14MB of virtual memory, install the free Mode32 system extension. All this updating runs about $200 (not including software upgrades for System 7 compatibility).

Despite the SE/30's performance edge, greater RAM capacity, stereo sound, and expansion slot, the Classic II is a better value for new buyers because it is so much less expensive. The Classic II effectively replaces the SE/30 by undercutting its price by $1470 (the SE/30, with 2MB of RAM and a 40MB hard drive, currently retails for $3369).

The Classic II's price and performance neatly fill the gap between the old Classic—the only choice for people on mercilessly tight budgets—and the LC (or a member of the Mac II line) for those who want color or an expansion slot. For a basic Macintosh with power for System 7 and today's complex application programs, the Classic II is the right choice. M

See *Where to Buy* for contact information.

Contributing editor ***Lon Poole's*** *latest books are* Amazing Mac Facts *(Microsoft Press, 1991) and* Macworld Guide to System 7 *(IDG Books Worldwide, 1991).*



Dear **D.Pogue,**

Happy Holidays, ol' pal! May the lights twinkle brightly in your living room at **P.O. Box 57655, Cathedral Station**! Here's hoping the big recession hasn't affected the **Contributing Editor** industry.

Seems like only yesterday I sat here in front of my Radius four-page display to write last year's Family Holiday Letter. I guess time flies when you're lucky enough to own a pair of every Mac model ever made (although one of my 128K's is now an ant farm).

Let's see . . . family news. I'm told that Maggie left me sometime in May. That was just about when System 7 appeared, so I was probably up to my ears in TrueType and virtual memory at the time. (Guess Maggie wasn't System 7–compatible, ha ha.)

Son Tad began his psychoanalysis practice this spring. As a gag, I let him "practice" on me—I offered to pretend that I had some emotional problems. His official advice was to spend less time "hunched in front of the $%¤*@¿! screen like some kind of phosphor freak." I suppose he's right . . . I should try to sit up straighter.

Other news from our friends in medicine: at my recent physical, Dr. Hornblatt told me I've got something called Trash Can Burn-In on both my corneas. And he told me to get some exercise—he said the only parts of my body receiving regular blood flow were the fingers. I told him that nothing gets my pulse racing like a good accounting package, but he wouldn't budge. Oh well, in each life some systems must crash.

It's been a struggle keeping my software collection complete. But I finally managed to track down that elusive copy of SpermBankerPro 3.1.5.2, and Apple's Customer Appreciation Evangelist gave me Traditional Swahili Clip Art Volume III for Xmas, so I think I've finally got everything.

Am enclosing pix of a few early presents sent by well-wishers. (Would've sent this sooner, but you know me—I never send out photos until I've scanned them in and color-corrected them.) For those of you who played Santa to me and my boy this year—ho ho ho, you've made our Christmas merry! How could you know there were still a few items I didn't already have? If you can find a gift for me, I'll bet you can find one for absolutely anyone.

Anyway, if things ever get dull in **New York, NY 10228-3884**, do swing by Hoboken. You know I'll always roll out the mousepad for you.

Your buddy,
Chip Puller

Dear Editors,

For the Mac That Has Everything

BY DAVID POGUE

I'M REALLY SORRY. I'VE RACKED MY BRAINS, AND I CAN'T COME UP WITH ANYTHING CLEVER FOR THIS YEAR'S CHRISTMAS GIFT SUGGESTIONS ARTICLE. MAYBE YOU'VE ASKED THE WRONG AUTHOR—FOR EXAMPLE, LOOK AT THIS LETTER THAT JUST CAME IN FROM SOMEONE I MET AT A TRADE SHOW LAST SUMMER. NOW *THIS* GUY KNOWS THE MAC PRODUCT RACKET!



This Kensington Printer Muffler 80 ($69.95) works great on an ImageWriter. Too bad it's not as effective on Uncle Pete. In the meantime, Christmas carols blast from my Persona MacSpeaker ($175), and I made the holiday decorations using my laser printer and these nifty ColorTAG colorizing sheets from LetraSet ($12.95).

ILLUSTRATIONS BY DAVID PETERS



Help! Help! There's a Talking Moose on my screen (Baseline, $39.95)! Or maybe it's only a pop-up animated screen saver that utters snide remarks through my Mac speaker. I'll make him feel at home by drawing a forest with a superhilarious paint program, Kid Pix (Brøderbund, $49.95). Or maybe I'll just suck him out of existence with my Wacky Vac, the incredible keyboard/screen-cleaning vacuum attachment (IdeaWorks, $9.99).

Dad doesn't look happy about it, but my laser printer Organizer (CoStar, $229.95) makes life easy when I go on an office-rearranging binge. Of course, now that I've got the super-ergonomic Silhouette Trackball (EMac, $99.95), I can turn my old trackballs upside down to make casters for the couch. And I won't forget to do that, either—I keep my to-do list in FlashWrite II, the world's most convenient notes/text processor—hit a key and it fills your screen (shareware, $15).





Yowzah, I'm one well-connected guy! For example, connected to the floppy drive of my SE is a LightningScan Compact hand scanner (Thunderware, $359)—look, Ma, no SCSI! Then my keyboard goes into Power Key (Sophisticated Circuits, $99), so I can turn on my SE with the big, fat button on the keyboard. I've also got PowerKey Remote, so I can turn on my Mac with a phone call (Sophisticated Circuits, $49)...'cause you never know when I might have to go on a sudden trip. And the modem port, of course, is hooked up to Hayes's Personal Modem 2400plus ($199). Can't use it now, though—looks like Tad's making another one of his important calls to some prestigious psychiatric institution. And underlying it all, you can see my favorite bedsheets... SpreadSheets (Bedware Unlimited, $24.95 and $34.95 for twin and queen sizes, respectively).

Wow, the fun you can have! 3 in Three (Inline Design, $49.95) is an incredibly addictive, almost hallucinatory game by the author of Fool's Errand. When I'm not playing it, I'm playing Spaceship Warlock, the wild, interactive, CD ROM adventure from Reactor ($95). My other favorite CD ROM disc is Terrorist Group Profiles (Wayzata, $79). A couple of Tad's friends stopped by to take me on a special holiday trip to an exclusive resort; at least I've got my critical software in my Solid Oak Disk Box (MacConnection, $32), and my notebook Mac is on order... so I'm sure I'll have plenty to do. See you next year!





Contributing editor David Pogue wants to make it clear that any resemblance between the fruitcake depicted in this article and any real person, living or dead, wouldn't surprise him a bit.

HIGH-PERFORM

Macworld Lab tests 22 workgroup page printers



Apple's LaserWriter IIg (right) boasts PostScript Level 2 and new technologies that improve text and graphics quality. Hewlett-Packard's LaserJet III PostScript Printer (center) produces sharp text, but it's slow, especially next to the HP LaserJet IIIsi. The QMS-PS 815 (left) can be upgraded to the 600-dots-per-inch QMS-PS 815MR.

ANCE PRINTING A

by Jim Heid

personal laser printer is terrific—for one person. Most offices can't build a network around a printer that churns out only a few pages per minute. Lines would form, thumbs would twiddle, and little would get done.

Some businesses produce reams of paperwork—legal briefs, contracts, manuscripts—and need a printer whose mechanism, or engine, can print at least 6 to 10 pages per minute, and for serious paper pushers, 10 to 20 ppm. Also helpful are multiple bins that cut down feeding sessions and allow easy switching between letterhead and second sheets.

Other offices create documents that are more intricate than lengthy. Newsletters and manuals typically contain many fonts and type sizes, as well as scanned images and graphics created with illustration programs. A printer's ability to handle complex jobs depends on its controller, a built-in computer that processes incoming jobs and tells the engine where to apply toner dots on the page. In the graphics- and type-heavy Macintosh world, a printer with a fast controller and a slow engine is often faster than a unit with a slow controller and a fast engine.

Most, but not all, of the printers reviewed here combine a fast engine with a speedy controller, and all had a suggested retail price of at least $3000 (Epson and Qume lowered their prices to below $3000 at press time). Some are newly born, others are graying at the temples. Some have much in common with the printers reviewed in last May's "Personal Page Printers Arrive" but are faster, making them better suited to small offices and workgroups. Others are industrial-strength beasts that can print legal-size (11-by-17-inch) pages. One product—Xante's Accel-a-Writer II—is an upgrade board that speeds and sharpens LaserWriter II's. "Coming Attractions" previews more printers that should ship by the time you read this.

In many cases, the extra cost of a pricey printer buys sharper output. Most page printers lay down 300 dots per inch, but several have resolutions of 600, 800, or even 1200 dpi. Printers from Hewlett-Packard and Apple use 300-dpi engines but sharpen their output by aiming their laser like a sharp-



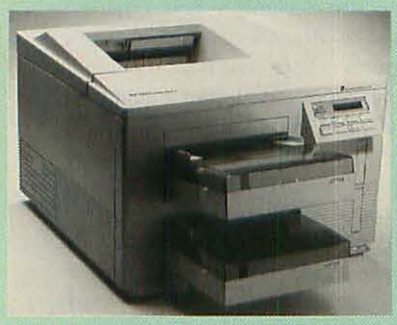
Brother's HL-8PS PostScript clone doesn't do justice to Type 1 fonts, and is a mediocre performer, to boot.



Dataproducts LZR 1260i Aging but still spry, the LZR 1260i pairs a reasonably fast controller with a rugged, 12-ppm engine. A paper feeder is an $895 option and includes tray-switching software.



Epson EPL-7500 The first PostScript laser printer from this dot matrix vendor is a winner. Its RISC-based controller is hot, but the 6-ppm engine's performance cools with lengthy documents.



Hewlett Packard LaserJet IIIsi PostScript-equipped LaserJets are usually slow—but not this one. Its 17-ppm engine and RISC processor give you great performance. You also get Resolution Enhancement technology for sharp text, and software for controlling tray-switching and duplex-printing. The IIIsi is a printer an office can fall in love with.

COMING ATTRACTIONS

The following printers should be available by the time you read this.

- *Dataproducts LZR-960 ($2995)* With a 9-page-per-minute Sharp engine driven by a RISC-based Adobe PostScript Level 2 interpreter, this printer will probably outrun Epson's sprightly EPL-7500. A second 250-sheet tray will be available as an option.
- *Dataproducts LZR-2455 ($17,785)* A 24-ppm workhorse designed to print up to 120,000 pages per month, the LZR-2455 uses PhoenixPage, a PostScript-clone interpreter. A duplex model, the LZR-2455D, will be available for $21,785.
- *NewGen Systems TurboPS/840e ($5495)* This updated version of the TurboPS/480 includes NewGen's Image Enhancement technology, which, like Hewlett-Packard's Resolution Enhancement technology and Apple's FinePrint, smooths text and line art by finely controlling the laser. The printer also provides automatic emulation sensing.
- *Printware Pro III ($17,990)* The Pro III provides 1200-dpi resolution and the ability to print legal-size pages. It includes 12MB of memory and a 40MB hard drive for font storage.
- *Texas Instruments microLaser Turbo ($3199) and microLaser Turbo XL ($5199).* Turbocharged updates of TI's trusty microLasers, these provide RISC-based PostScript Level 2 interpreters. A 500-sheet paper tray is an extra option for the 16-ppm XL model. A $1750 upgrade will be available for existing microLasers.

shooter. Apple's new printers, in particular, set quality standards that even printers with higher resolutions can't always match.

All the printers reviewed here use the PostScript page-description language. Most are built around genuine Adobe Systems' PostScript interpreters, but some use interpreters created by other firms. These so-called PostScript clones perform better than pioneering clones of the past, although they still have their faults.

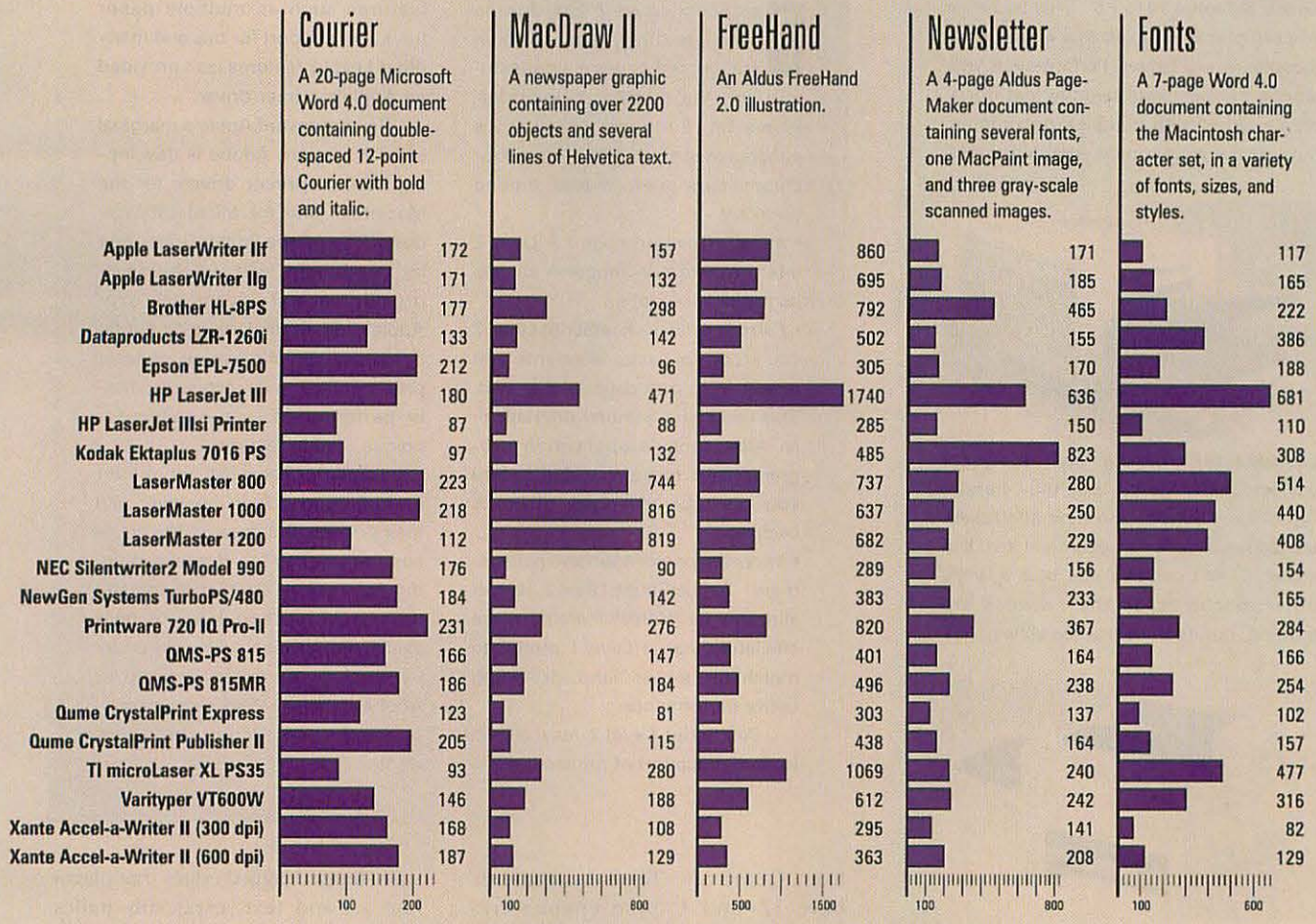
Controller Trends: Faster and Smarter

Not long ago, most high-end printers used Motorola's 68020 in their controller board, the same microprocessor in the Macintosh LC and the original Mac II. Today's trend is toward faster processors—Motorola's 68030 or specialized RISC processors. (RISC stands for reduced instruction set computer, a processor that has been streamlined for fast performance of specific tasks; all printers reviewed here have RISC chips except those with chips from Motorola.) These processors also dance to a faster beat—a clock rate of 16MHz used to be the standard in high-performance printers, but some printers now use chips with 20MHz and 25MHz clock-speeds. Some printers also include co-processors that free the main processor from tasks such as communicating with the Mac. All this extra processing punch means faster printing, especially of complex documents (see "Time for New LaserWriters.")

Like their predecessors, the latest controllers provide emulation modes that allow the printer to imitate a non-PostScript printer. The new controllers also sport connectors for attaching to IBM PCs and other non-Macs. Some printers force you to flick switches to change operating modes, but many provide *emulation sensing:* if incoming data isn't PostScript, the controller switches to the appropriate emulation mode. Similarly, in these smarter controllers, all connectors are active simultaneously, a feature called *all ports active;* when one begins receiving data, the others go on hold. Offices with Macs and PCs should look for this innovation as well as a Centronics parallel port. The latter transfers data faster than a serial port, the other port often used to connect PostScript printers to PCs.

MW LAB Time for New LaserWriters

All times are in seconds.



Hewlett-Packard leads the way—and brings up the rear. The LaserJet IIIsi, with its RISC controller and 17-pages-per-minute engine, was the all-around performance champion, while the LaserJet III, with its 10MHz 68000-based controller, finished last. Apple's new LaserWriters turned in excellent times, although the memory-intensive PhotoGrade technology slowed them in the halftone-intensive FreeHand tests. PostScript compatibility was evaluated using Genoa Technology's Emulation Compatibility Test Files.

Another amenity is a SCSI port for connecting a hard drive, which can store fonts that would otherwise have to be downloaded from the Macintosh. A printer's hard drive speeds the printing of any typographically complex job, but especially those jobs containing fonts you have downloaded to the hard drive.

A printer's hard drive boosts performance in part because it eliminates downloading fonts over the LocalTalk network (20 to 30 seconds per font). LocalTalk is also a bottleneck for printing large scanned images. For these reasons, some printers have connectors for Ethernet, a networking scheme that transfers data many times faster than LocalTalk. To use Ethernet, Macs need their own Ethernet expansion boards and connectors. The latest 68040-based Macs have built-in Ethernet connectors.

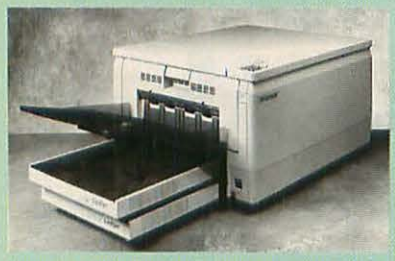
Finally, several new printers—including Apple's LaserWriter IIf and IIg—use PostScript Level 2, a significant enhancement to PostScript that promises, among other things, faster printing times. PostScript Level 1 printers are not obsolete; they can print anything Level 2 printers can print. But Level 2 will be better able to exploit Adobe's forthcoming PostScript printer-driver software (see "Adobe: One Level Ahead").

Engine Trends: Faster and Sharper

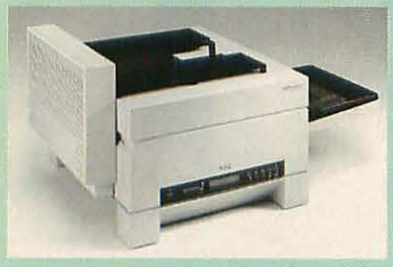
A PostScript printer's photocopier-like engine usually has no trouble keeping up with its controller; only when printing simple documents do most engines reach their rated speed. Nonetheless, a fast engine is rarely wasted in large offices, especially if paired with a 68030- or RISC-based controller. Among $3000 to $5000 printers, most have 8- to 10-ppm engines. However, midpriced printers



Kodak Ektaplus 7016 PS This two-tray, 16-ppm printer doubles as a 6-ppm photocopier—very clever. Performance was among the best with lengthy text documents, good with complex documents, but was the worst on the newsletter test.



LaserMaster printers have adequate performance figures, but they handle Type 1 fonts poorly, and their controllers are NuBus boards that you must install in a Mac II. You can use that Mac II while other machines on the network are printing, but its performance slows.



NEC Silentwriter 2 Model 990 The Silentwriter 2 Model 990's RISC-based controller drove it to a close second-place finish in the FreeHand test, and to second- or third-place showings in our other controller-intensive tests. Hook a hard drive to the SCSI port, and it's even faster.



NewGen's PostScript clones are fast enough, but they handle Type 1 fonts poorly, and their differing horizontal and vertical resolutions introduce undesirable output artifacts.

ADOBE: ONE LEVEL AHEAD

PostScript Level 2 has dozens of new features, many of which are geared toward imagesetters and the growing color printer market. But some of Level 2's enhancements will affect the monochrome page-printer market. Among them are

- *Image decompression* A Level 2 interpreter can decompress images as it processes jobs.
- *Forms caching* PostScript Level 2 can store, or cache, elements that repeat from one page to the next. This can speed printing dramatically. Alas, today's application programs have to be modified before you can take advantage of forms caching.
- *Improved printer-memory management* A PostScript Level 2 printer allocates its internal memory more efficiently than a Level 1 printer to match the job at hand, providing better performance.

PostScript Level 2 also allows for better support of printer-specific features such as multiple paper trays. But support for this and many other Level 2 features isn't provided by Apple's printer driver.

To circumvent Apple's marginal Level 2 support, Adobe is developing its own printer drivers for the Macintosh and for Microsoft Windows. The Adobe Printer Driver, due by year's end, will, Adobe says, provide several advantages over Apple's driver, including on-the-fly compression; elimination of laser prep conflicts over networks; faster performance; and support for unique engine features.

Adobe's plans call for printer developers to include the driver with their printers. But because the driver has the potential to improve printing for existing PostScript printers (including Level 1 models), Adobe is also contemplating selling the driver by itself. If the driver lives up to Adobe's claims, chances are everyone with a PostScript printer will want a copy.

from Qume and Texas Instruments have 12- and 16-ppm engines, respectively—speed that used to cost considerably more.

A built-in or an optional second paper tray is also becoming more common. Ideally, you could use the Print dialog box to make both trays earn their keep—to specify, for example, that letterhead be printed from one tray and subsequent pages from the other. Apple's LaserWriter driver offers no such options, although Adobe's printer driver will. In the meantime, some printers include software that allows midjob tray-switching. Without such software, the second tray acts only as a backup: when tray one empties, tray two kicks in.

Perhaps the most exciting printer trend is the push to sharper output—to printers that can produce final copy for newspapers and in-house publishers, and more accurate proofs for jobs destined for imagesetters. Resolutions beyond 300 dpi reduce the stair-stepped jagged edges that plague line art and text, especially italics. Higher resolutions also enable a printer to produce halftone screens with more lines per inch, improving halftones of scanned images.

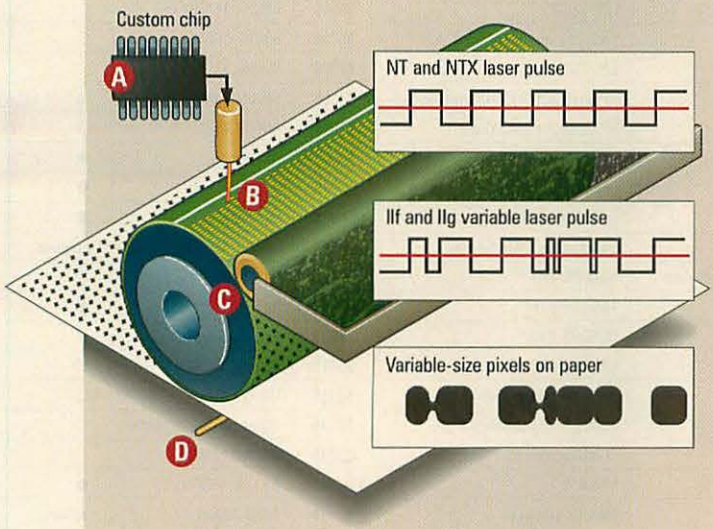
Techniques behind Higher Resolution

There are a few paths to higher resolution. The oldest involves shortening the pulse of the printer's laser to apply more dots per inch in the horizontal direction. Printers that tread this path usually have a horizontal resolution that's twice that of their vertical direction. LaserMaster, Printware, Qume, Xante, and NewGen Systems use this approach.

Higher horizontal resolution does produce smoother round characters, such as *e* and *o*, as well as smoother italics and nearly vertical lines. But a side effect surfaces: output quality changes, usually for the worse, when you print a horizontally oriented (for example, 11-by-8½-inch) document.

How the LaserWriters Change Their Dots

Apple's, QMS's, LaserMaster's, NewGen's, and HP's new printers all enhance black-and-white images by controlling the duration or the pulse-rate of the laser beam. Below is an illustration of how the LaserWriter IIf and IIg use this control over the laser pulse-rate to create variable-size pixels.



A) The top inset box shows how the older LaserWriter NT and NTX use a constant pulse rate, which results in identically sized pixels. The IIf and IIg use a variable pulse rate (middle box) to produce pixels of varying size (bottom box).

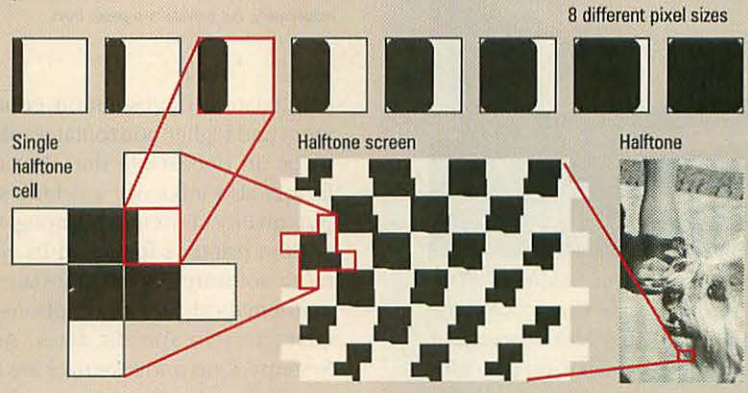
B) At any spot where the laser exposes the photosensitive drum, the drum becomes positively charged. Since the laser can pulse at a variable rate, charged areas on the drum can vary in size. Shorter laser pulses create smaller charged areas.

C) Charged areas attract toner as the drum rotates past the toner compartment. Smaller charged areas attract fewer toner particles, creating smaller dots.

D) A charged wire attracts toner from the drum onto the paper. Toner particles also have a tendency to stick together, and merge with each other—further smoothing out lines and gradations.

PhotoGrade: Getting More Grays

Apple's PhotoGrade technology uses irregular laser pulses to sculpt pixels and simulate gray shades. Theoretically, PhotoGrade's laser pulses can slice a 300-dpi pixel into 16 different pixel sizes. However, because charged toner particles tend to attract more toner particles, a printer can't produce such fine slices of a pixel. The practical number of sizes is slightly more than 8. The PhotoGrade chip combines 8 pixels into a pinwheel-shape halftone cell. When put together, these cells form a halftone screen that allows the printer to simulate up to 67 gray shades.



The difference is much more noticeable on printers with dpi resolutions of 600 by 300 and 800 by 400 than on higher-resolution models.

Some resolution claims must be taken with a grain of toner, as firms anxious to outsharpen competitors turn up the hype as well as the resolution. Beware of the phrase "apparent resolution," which refers not to the actual number of dots per inch on the page, but to the number of dots the manufacturer claims its technology simulates. LaserMaster's TurboRes technology, for instance, combines doubled horizontal resolution with careful dot placement that further smooths jagged edges. But instead of saying that, the company's ads often tout a resolution of "1000 dpi by 1000 TurboRes" for the LaserMaster 1000, whose true resolution is 1000 dpi by 400 dpi.

Then there are the resolution-enhancement tricks that Hewlett-Packard and Apple rely on. Rather than applying a larger number of same-size dots, HP and Apple sculpt dots within the 300-dpi grid, finely adjusting their size and position to sand off the jaggies. Apple says its FinePrint technology outsharpens HP's Resolution Enhancement technology (RET), and under magnification, FinePrint output bears out the claim. Apple gains a bigger edge with PhotoGrade, a technology that improves the appearance of gray-scale images. A 300-dpi printer's optimum halftone screen ranges from 50 lines per inch to 60 lpi, a frequency that allows for about 30 gray levels; PhotoGrade allows for screens of up to 106 lpi with 67 grays (see "PhotoGrade: Getting More Grays").

LaserMaster and NewGen Systems have their own enhancement technologies, and you might expect the



Printware 720IQ Pro II Offering true 1200 by 600 resolution, the Printware 720IQ is a better choice than LaserMaster's offerings, but it's still a specialized printer only publishing pros should consider. Downloading Type 1 fonts to its hard drive is an awkward process.



QMS-PS 815 Four dollars less than the LaserWriter IIg, but slower. Still, a solid performer that you can upgrade to the 600-dpi PS 815MR for just $500.



Qume's CrystalPrint Express The CrystalPrint Express's PostScript-clone interpreter has heavy-looking resident fonts and yields chunky results with Type 1 downloadables. But with a RISC-based controller and a two-tray, 12-ppm engine, the printer finished near the top in every speed test. A 600-by-300-dpi mode slows performance and introduces disparities between horizontal output and vertical output.



Qume's CrystalPrint Publisher II still fails to impress me. It's fast, but its paper handling is weak, and the printer doesn't do justice to Type 1 fonts.

HIGH-PERFORMANCE PRINTERS

	Printers	Price	Processor	Hard drive for fonts
Apple	LaserWriter IIf	$3999	68030, 20MHz	optional
	LaserWriter IIg	$4999	68030, 25MHz	optional
Brother	Brother HL-8PS	$4495	TMS 34010, 40MHz	○
Dataproducts Corporation	LZR 1260i	$5995	68020, 16MHz	○
Eastman Kodak	Kodak Ektaplus 7016 PS	$5795	68020, 10MHz	○
Epson America	EPL-7500	$2999	Weitek XL-8200	○
Hewlett-Packard	HP LaserJet III PostScript Printer	$3395	68000, 16MHz	○
	HP LaserJet IIIsi Printer	$6995	AMD 29000	○
LaserMaster Corporation	LaserMaster 800	$4995	proprietary	●[2]
	LaserMaster 1000	$6995	proprietary	●[2]
	LaserMaster 1200	$14,995	proprietary	●[2]
NEC Technologies	Silentwriter 2 Model 990	$4995	Weitek XL-8200, 8MHz	optional
NewGen Systems Corporation	TurboPS/480	$7495	Intel 80960	○
Printware	720 IQ Pro-11	$13,990	multiple	●
QMS	QMS-PS 815[3]	$4995	68020, 20MHz	○
	QMS-PS 815MR[3]	$5495	68020, 20MHz	○
Qume Corporation	CrystalPrint Express	$3495	Weitek XL-8200, 16MHz	○
	CrystalPrint Publisher II	$2995	Weitek XL-8200, 4MHz	○
Texas Instruments	TI microLaser XL PS35	$3249	68000, 12MHz	○
Varityper	VT600W	$14,995	68020, 16MHz	●
Xante Corporation	Accel-a-Writer II	$2495	AMD 29000	optional

● = yes; ○= no. [1] E = Ethernet, L = LocalTalk, P = Centronics parallel, S = serial. [2] Fonts must be stored on Mac's hard drive. [3] QMS-PS 825 ($5995) and 825MR ($6495) are identical to the QMS-PS 815 and 815MR, respectively, but provide two paper trays.

combination of resolution enhancement and higher horizontal resolution to be an unbeatable duo. But other factors also influence a printer's output quality. Foremost among them are the printer's fonts and its *rasterizing* software, which translates the mathematical font descriptions into characters in specific sizes. Adobe Systems' fonts and rasterizer are finely tuned for the limitations of laser printers. LaserMaster and NewGen are members of the clone club, however. As a result, their text quality sometimes falls short, especially when you print Type 1 fonts, the most popular format for downloadable fonts.

QMS's approach to sharper output is through higher resolution. The QMS-PS 815MR and PS 825MR are true 600-by-600-dpi printers—the first of which to cost less than $10,000. QMS says its Multi-Res technology finely controls the laser in both horizontal and vertical axes. Because the QMS MR printers provide the same resolution in both axes, their output should look identical in vertically and horizontally oriented documents. Differences are discernible under magnification, but they aren't nearly as significant as the disparities in most LaserMaster and NewGen output.

And because the Multi-Res printers rasterize fonts at 600 dpi, their text is a bit more faithful to the original type design—although only type buffs are likely to notice the difference. A 300-dpi printer must make more extensive use of a font's *hints,* instructions that a controller uses to optimize characters for a given size and resolution by, for example, straightening gentle curves that a 300-dpi printer can't render accurately.

The TrueType Question

Apple's release of System 7 and its TrueType outline fonts came with assurances that TrueType fonts would print on all PostScript printers. That didn't prove to be true. To enable PostScript printers to rasterize TrueType fonts, version 7.0 of the LaserWriter driver downloads TrueType rasterizing software to a PostScript printer's memory, in essence teaching the printer how to rasterize TrueType fonts. Some PostScript printers don't properly support the

Emulations	Interfaces [1]	Emulation switching	Resolution (in dpi)	Maximum speed (in ppm)	Maximum paper size	Two paper trays	Multiple-tray software
HP PCL 4	L, S	●	300, enhanced	8	8½ × 14	○	NA
HP PCL 4	E, L, S	●	300, enhanced	8	8½ × 14	○	NA
HP PCL 4	L, P, S	○	300	8	8½ × 14	○	NA
HP PCL 3	L, P, S	○	300	12	8½ × 14	optional	○
HP PCL 4 HPGL, Epson FX-80	L, P, S	●	300	16	8½ × 14	●	NA
HP PCL 4	L, P, S	○	300	6	8½ × 14	○	NA
HP PCL 5	L, S, P	○	300, enhanced	8	8½ × 14	○	NA
HP PCL 5	E (optional), L, P, S	○	300, enhanced	17	8½ × 14	●	●
none	L	NA	800 × 400, enhanced	8	8½ × 14	one	NA
none	L	NA	1000 × 400, enhanced	8	8½ × 14	one	NA
none	L	NA	1200 × 600, enhanced	14	11 × 17	two	○
HP PCL 4	L, P, S	○	300	8	8½ × 14	one	NA
Epson LQ-800, HP PCL 3	L, P, S	○	800 × 400	8	8½ × 14	one	NA
none	L, P, S	●	1200 × 600	8	8½ × 14	one	NA
HP PCL 4	L, P, S	●	300	8	8½ × 14	one	NA
HP PCL 4	L, P, S	●	600 or 300	8	8½ × 14	one	NA
HP PCL 4	L, P, S	●	600 × 300 or 300 × 300	12	8½ × 14	two	●
HP PCL 4	L, P, S	○	300	6	8½ × 14	one	NA
HP PCL 4, Diablo 630, Epson LQ-850, IBM	L, P, S (optional)	○	300	16	8½ × 14	optional	●
none	L, P, S	○	600	10	11 × 17	○	NA
HP PCL 4	L, P, S	○	600 × 600	8	8½ × 14	○	NA

PostScript commands the rasterizer needs, however, and wouldn't print our TrueType test document.

Affected printers included most of QMS's newest models, including the QMS-PS 815 and QMS-PS 825 (and their Multi-Res counterparts) as well as the $2795 QMS-PS 410 I recommended so highly last May. QMS has fixed the problem, and free upgrades are available for printers with this problem. Call 205/633-4500 for QMS tech support.

Another victim was the HP LaserJet IIIsi containing firmware version 5.1. The problem doesn't occur in LaserJet IIIsi models that are factory-equipped with LocalTalk interfaces. However, if you bought an early IIIsi without LocalTalk and you want to add LocalTalk now, you need to upgrade the printer's firmware. For details on obtaining HP's free upgrade, call 208/323-2537 between 8 a.m. and 5 p.m. mountain standard time. (The version number appears in the IIIsi's test page, not its start-up page.)

There's another, subtler issue behind TrueType and high-performance printers. The LaserWriter driver's TrueType rasterizer works only in printers containing 68000-family processors. If you print a TrueType font on a RISC-based printer, the LaserWriter driver must convert the font into a Type 1 PostScript font, which it then downloads to the printer. This convert-and-download routine can be slow, especially when you print from a Mac Classic, Plus, or SE. If you're buying a RISC-based printer (and you are if the printer doesn't have a 68000-family chip from Motorola), you may want to steer clear of TrueType fonts.

In August, Apple and Adobe announced a letter of intent with Apple Computer that calls for the inclusion of Adobe's Type 1 font technology in a future version of System 7. While many details remained vague at press time, the deal will clearly benefit users of Adobe technology by providing them with Adobe Type Manager's scalable screen fonts as a seamless part of the operating system. How the deal benefits TrueType users is less clear, since the announcement did not indicate that Adobe has any intention of including direct support for TrueType in future versions of its PostScript interpreters. As it stands, PostScript fonts will be easier to use under System 7, while all the current performance penalties inherent in using TrueType on PostScript printers remain in place.

MW EDITORS' CHOICE

My recommendations fall into three categories: great choices, good choices, and printers that I can't recommend for most users. Here are my top picks, all newcomers: Hewlett-Packard's LaserJet IIIsi, Apple's new LaserWriter IIf and IIg, and the QMS-PS 815MR and QMS-PS 825MR. All use advanced laser technology to improve text and line-art output, and in the case of Apple's and QMS's offerings, gray-scale output, too.

The 130-pound LaserJet IIIsi's text quality is surprisingly close to that of the higher-resolution lasers. Its Resolution Enhancement technology doesn't improve halftones, however. The LaserJet IIIsi's real strengths are speed and paper handling—a sizzling, RISC-based controller talks to a Canon engine that has two deep paper trays and can print on both sides of a sheet (duplex printing). An optional Ethernet interface further boosts performance.

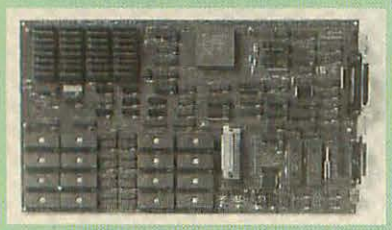
Apple's LaserWriter IIf ($3999) and IIg ($4999) lack the LaserJet IIIsi's paper handling and overall spunk. Apple's latest printers were slower in all the tests, especially the Courier test, where the LaserJet IIIsi's 17-ppm



Texas Instruments' TI microLaser XL PS35 Sixteen pages per minute for just over $3000? There are catches: that price includes just 1.5MB of memory; you'll need at least another megabyte ($239) for good controller performance and to print legal-size pages. Also, the microLaser XL is slower than most when printing complex documents. A 500-sheet second tray costs $345 and includes switching software. A 17-font version, retails for only $2899.



Varityper's VT600W is a costly, specialized printer that only publishing professionals should consider. If you want 600-dpi output and don't need legal-size printing, QMS's Multi-Res models are better choices.



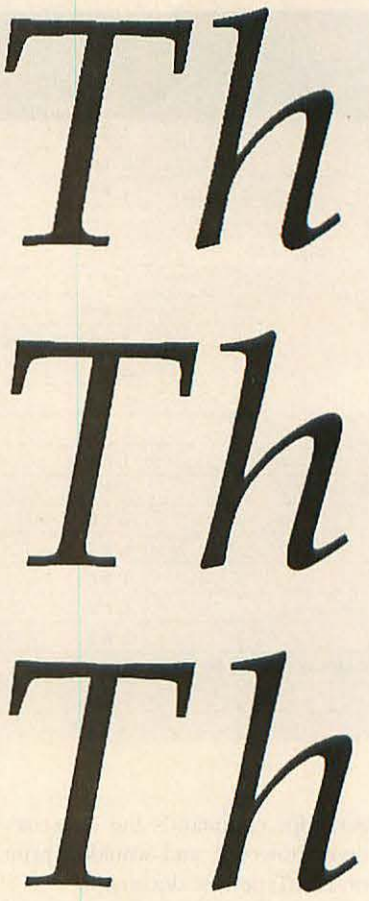
Xante's Accel-a-Writer II is a complete controller board replacement that uses the PhoenixPage PostScript-compatible interpreter, and it makes a LaserWriter II one fast clone. The latest version's 600-by-600-dpi resolution produces fine results without the orientation side effects of its 600-by-300 predecessor. On balance, a better and less expensive, albeit slower, way to upgrade an aging LaserWriter II is with Apple's own LaserWriter IIf upgrade ($1399) or IIg upgrade ($2399). However, the Accel-a-Writer is also available for the older LaserWriter and LaserWriter Plus, as well as for the Personal LaserWriter LS and NT, an option not currently supported by Apple.

engine gave it the edge. The LaserWriter IIf and IIg cost considerably less, however, and their PhotoGrade-enhanced halftones are significantly better. And FinePrint outsharpens HP's Resolution Enhancement technology. The LaserWriter IIg is the faster of the two, especially when you use its Ethernet interface. You'll need to upgrade the IIf's memory to at least 5MB in order to use PhotoGrade.

The QMS-PS 815MR and QMS-PS 825MR are the slowest among the top picks, but they do produce beautiful copy. (Performance improves in their 300-dpi mode.) Their 600-dpi text is actually a bit more jagged than HP's RET or Apple's FinePrint output, but because they rasterize text at 600 dpi, their type is more faithful to the original design. More jagged but more accurate—that's the paradoxical trade-off you face when deciding between resolution enhancement and genuinely higher resolution. As for halftone quality, QMS's MR series beats HP but is beaten by Apple. If you need better paper handling than Apple provides but can't justify the LaserJet IIIsi's cost (or you want better halftones), the QMS-PS 825MR is an excellent choice. If 300 dpi will do, consider the QMS-PS 815 ($4995) or the two-tray QMS-PS 825 ($5995), both of which can be upgraded to the 600-dpi models. There's also the QMS-PS 820 ($4995), which is slower, lacks emulation sensing, and contains 35 fonts instead of its siblings' 45.

QMS makes two more contenders that we didn't test but that I worked with at a QMS sales office. For printing legal-size pages, there's the PS 2210 ($9995). Alas, its 68020 controller can't keep up with its 22-ppm engine. The QMS-PS 2000 provides more-balanced performance: a 20-ppm engine, a 25MHz RISC-based controller, optional hard drives and Ethernet, and paper options galore. In tests I ran at QMS offices, the PS 2000 was faster than any printer reviewed here. It may be the fastest PostScript printer available. It starts at $15,995.

As for the printers discussed in "Coming Attractions," it remains to be seen whether their features and performance will be appealing enough to offset the print-quality advantages that



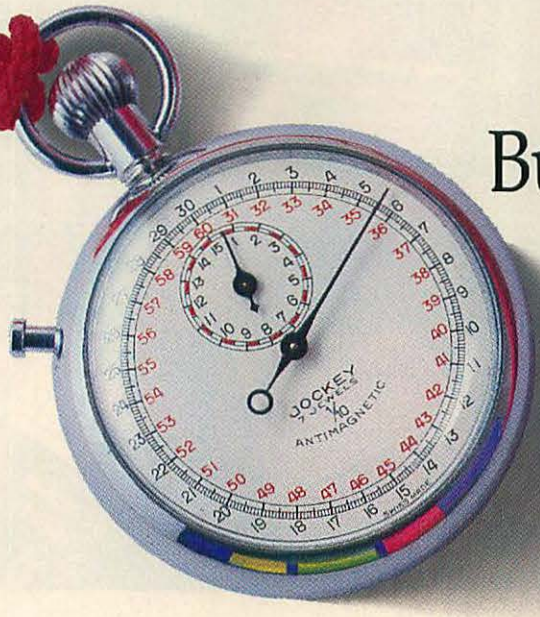
The difference between LaserWriter IINTX output (top) and LaserWriter IIg output (middle) is immediately apparent, but discerning between IIg output and that of a Hewlett-Packard LaserJet IIIsi (bottom) is harder. Note that in the HP output, especially on the tops of the *T* and the *h*, the serifs have a slightly less graceful curve. FinePrint does a better sharpening job than HP's Resolution Enhancement technology. Shown here is 36-point Palatino Italic, enlarged 200 percent.

HP, Apple, and QMS have. In the world of performance page-printing, there's high-resolution handwriting on the wall: the era of unenhanced 300-dpi output is ending. ■

See *Where to Buy* for contact information.

Contributing editor and columnist ***Jim Heid*** *has worked with nearly 75 laser printers since 1984. His lastest book is the* Macworld Complete Mac Handbook *(1991, IDG Books Worldwide).*

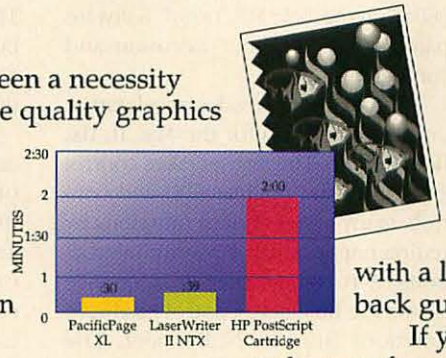
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REVIEWS

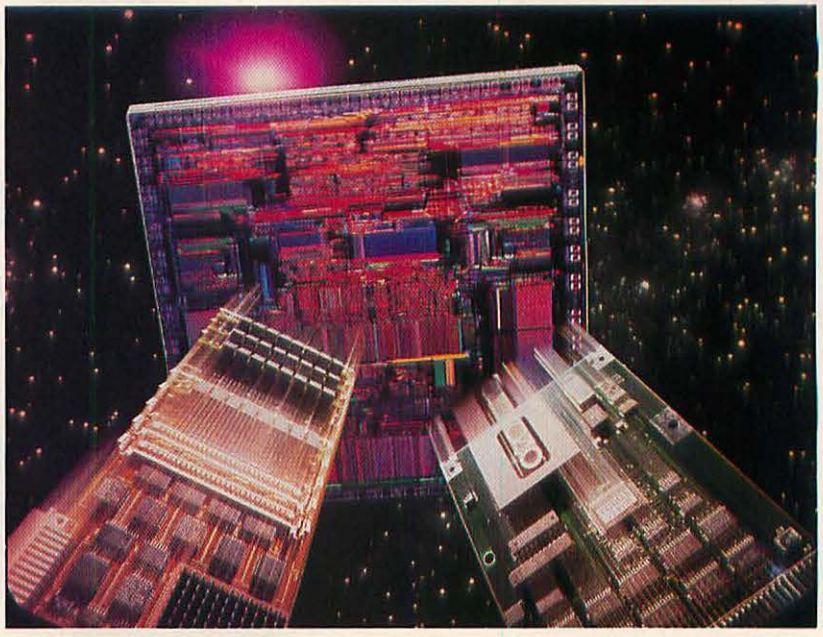
040 System Accelerators

TOKAMAC LC, SX, CI

Pros: Clean implementation; lower power requirement; available for low-cost machines. **Cons:** Exceptions list is not automatic. **Company:** Fusion Data Systems. **Requires:** Mac LC, IIsi, IIci; System 6.0.7. **List price:** TokaMac LC $2795; TokaMac SX $2995; TokaMac CI $3195.

RADIUS ROCKET

Pros: Well engineered; total system acceleration. **Cons:** High power requirement; exceptions list is not automatic; not compatible with IIfx or with many graphic accelerators. **Company:** Radius. **Requires:** Mac II, IIx, IIcx, IIci; System 6.0.7; 1MB of RAM on system board; 1MB of RAM on Rocket. Recommended: 8MB of RAM; SCSI accelerator and hard drive. **List price:** $2499.



LARRY KEENAN

Don't be lured by promises of speed. Upgrading to an 040—the latest, greatest processor—is an expensive prospect. The computer you have and what equipment you are prepared to buy are of pivotal importance in deciding on an 040 upgrade. You need to weigh the price-performance ratio, compatibility, power consumption, and expandability against the urgency of your needs.

In addition to Apple's Quadra 700 upgrade for the Mac IIcx and IIci (available in the first quarter of 1992), Fusion Data Systems and Radius also have 040 accelerators.

Fusion Data's TokaMac extends performance by using the Processor Direct Slot (PDS) of the Macintosh LC, IIsi, and IIci. Data and instructions are redirected from the original CPU to the 68040 on the TokaMac board. Software patches aid program execution and compatibility.

The Rocket provides acceleration on a NuBus board for the Mac II, IIx, IIcx, and IIci. The Rocket takes control away from the original CPU and controls many system board functions by redirecting internal hardware instructions. A two-stage start-up sequence allows the Rocket to control hardware functions from its NuBus slot. The Mac's processor is used as an input-output (I/O) coprocessor routing ADB and SCSI data to the Rocket. System RAM resides on the Rocket board.

The Rocket's invasive acceleration method has many advantages, but for full systemwide acceleration, additional hardware is required. The Macintosh has three main bottlenecks—the speed of the system RAM bus, the speed of the NuBus (over which standard video runs), and the speed of the SCSI I/O bus (over which data is retrieved to memory). With the Rocket's ability to support block transfers to SCSI accelerator boards, frame buffers, and video boards, and with up to 128MB of system RAM directly on the board, these bottlenecks are nearly eliminated—and others, such as hard drive speed, become dominant.

Unfortunately, Rocket software currently supports block transfers only to Radius's newer video boards, the Apple 8•24, the RasterOps 24L, and the E-Machines T19/24. Developers are working on boards for video capture and boards to exploit the capabilities of the next generation of SCSI drives, but no products are available yet. To maximize the system acceleration offered by the Rocket, you need additional boards that also support block transfer, and a drive with a high data-transfer rate.

The Radius board's chief difficulty is compatibility. While brilliantly engineered, the Rocket is not compatible with the Mac IIfx, with the early version of the Mac II (with "A" ROMs), with the accelerated mode of most video boards, or with any hardware or software that bypasses system software. In supporting the Rocket, Radius has taken on the monumental

task of supporting Apple-guideline offenders, including Apple.

With both the Rocket and the TokaMac, incompatibilities may be due to an application's memory management. The 040 uses a caching mode that deposits and uses data and instructions within large, fast caches inside the 68040. Frequently used information is *copied back* to the 040. In contrast, earlier processors write data to a small cache and to main memory; the slow speed of the system bus adds more time to this *write-through* process. Programs written to Apple's programming guidelines should run in 040 cached mode. But programs that circumvent standard system calls or that write directly to hardware will have trouble.

Since both boards run in copy-back and write-through cache modes, two levels of incompatibility exist. Applications that rely on write through are handled in the slower cache mode. Applications that send instructions directly to hardware cannot run unless the accelerator has been disabled.

Radius has added cache settings to its RadiusWare software that lets you set the type of cache: 040 (copy back), 030 (write through), or none. Radius doesn't preset the 040 cached mode for any applications, but it claims that every program on its RadiusWare list is 040-compatible. You must set each program to 040 mode and use trial and error to set the cache modes for other applications.

The TokaMac has a similar list in the control panel, but treats 040-incompatible applications as exceptions. Programs that use 030 caching run in Medium Mode. The TokaMac automatically slows down, but it does not automatically add these programs to its Medium Mode list. When you run a completely incompatible application with the 040, the TokaMac can temporarily turn itself off, and restart when you quit that application.

In its fastest mode, the TokaMac offers performance gains of 152 percent over IIci speeds in math-intensive operations, and 64 percent in other operations. On the Rocket, with 040 caching enabled, performance gains of 154 percent on math-intensive operations and 54 percent on nonmathematical operations over IIci speeds are commonplace. With a Radius GX and PLI QuickSCSI, the Rocket improves nonmathematical operations by 70 percent. Performance is slightly less with System 7.

Performance comes at the price of power. The Rocket, with 8MB of RAM, draws 22.5 watts from a NuBus slot designed to supply only 10w. The 040 itself draws only 5w. The total NuBus power budget for the IIcx or IIci is 30w. Using the Rocket's PDS slot draws even more power. (At press time, Radius has reduced the Rocket's power consumption to 12.5w on new shipping units by integrating the Rocket's supporting chips into low-power VLSI chips.) In contrast, the TokaMac LC draws 3.7w. Its 040 runs in a low-power mode, and its supporting chips use only 0.7w. This fits within the 5-watt power budget of the PDS for Macs.

Fusion Data has announced a lower-cost TokaMac using an 040 with some capabilities disabled. Radius has announced software that will provide distributed processing under System 7. But neither will appear until 1992.

Time to Upgrade

LC owners will be pleased with the faster processor on the TokaMac. Yet the price defies "low-cost." IIsi owners will gain nearly as much performance as IIci owners will, but will lose their NuBus expansion slot. Because of the Quadra's faster NuBus, superior SCSI port, and accelerated 24-bit video, IIci owners might benefit more from a Quadra upgrade than from the TokaMac CI (see "Macintosh Quadras: Power but No Pizzazz," this issue).

Due to the Rocket's high power requirement, IIcx and IIci owners should buy a Quadra upgrade. For Mac II and IIx owners without an upgrade path to Apple's new machines, the Rocket offers greater performance, compatibility, and expandability than a IIfx upgrade, for about the same street price. But, cheaper accelerators are available for the II and IIx. The Rocket is a clever, high-end solution; it can be used as a simple processor accelerator, and as such is reasonably priced, but the additional hardware required to maximize its performance might prove more vast than its capabilities.—**Tim Warner**

See **Where to Buy** *for contact information*

Notebook Computer

OUTBOUND NOTEBOOK SYSTEM

Pros: Upgradable CPU; high level of control over power-saving options; full-size tactile keyboard; runs Systems 6 and 7. **Cons:** Pointing device is difficult to use; system RAM is limited to 4MB; higher priced than comparable Mac notebook computers. **Company:** Outbound Systems. **List price:** $3999 (40MB hard drive, 4MB RAM configuration was reviewed); prices range from $2529 to $4299 depending on CPU, drive capacity, and amount of RAM.



Even before Apple announced its PowerBook notebooks, truly portable Macs were available from Outbound Systems. But is a Mac by another name really a Mac? Or is it a gamble?

Are They Compatible?

Both of Outbound's notebooks—the 68000-based System 2000 and the 030-based System 2030—are real Macs: they use Outbound logic boards but actual Mac ROM chips, thanks to a complicated licensing-and-resale agreement between Outbound and Apple. Most Outbounds use Plus ROMs, but some use 512K, SE, or Classic ROMs.

Because they use the older Macintosh ROMs, the Outbound notebooks can address no more than 4MB of RAM, although more is available as a RAM disk. Outbound notebooks using the 030 processor (but not those using the cheaper EC030, which has no memory manager) can also take advantage of System 7 virtual memory, which runs faster than disk-based virtual memory.

But notebooks based on older Macintosh ROMs do have one big advantage over the PowerBooks for many users: with the Outbounds, you can use System 6.0.7, so you are not forced to get 4MB of RAM just to run System 7 and one or two applications. (The PowerBooks require System 7.0.1.) This System 6 compatibility should appeal to budget-minded Classic and SE owners.

(continues)

According to Macworld Lab's benchmarks, the Outbound 2030 performs at about the same rate as a Mac IIcx, although scrolling and other screen-dependent tasks are about 20 percent slower, since the liquid crystal display (like all LCDs) takes longer to update than a cathode-ray tube (CRT) does.

Like most notebooks, the Outbounds have a rest mode to save battery power when not in continuous use. Compared with Apple's battery-management technology, the Outbounds offer more options, letting you select exactly what components (lighting, CPU, or hard drive) are to rest after user-defined periods of inactivity. The PowerBooks only let you enable or disable the rest feature.

How Do They Feel?

The Outbounds are real portables. They measure 11 by 8½ by 2½ inches—a tad smaller but a little thicker than Apple's smallest PowerBook—and they weigh 6¼ pounds, which is comparable to a PowerBook.

But the Outbounds do differ in three key ergonomic respects: keyboard, display, and pointing device. For the first two, the Outbounds offer better options than the low-end and midrange PowerBooks.

The Outbound keyboard has a more pronounced feedback that is likely to please touch typists and others who want a definitive click. Even better, the keyboard is full-size, not compressed, which means you don't have to relearn finger movements when switching from a desktop Mac. The layout is the same as the Apple keyboard's, minus the numeric keypad. You can attach a tilt bar to raise the back of the notebook so the keyboard angle better matches the angle of a desktop keyboard, but having to carry the bar separately is annoying, and it would be easy to lose the bar while on the road.

The passive supertwist LCD is larger than all the PowerBooks' displays: 10 inches diagonally, with a resolution of 84 dots per inch. It's a readable screen, although it doesn't compare to the active matrix technology used on the high-end PowerBook 170. Compared with other passive LCDs, the Outbound screen has more ghosting and has, at bright display levels, a yellow cast.

In its search for a compact pointing device, Outbound Systems settled on the TrackBar. This was a mistake. The TrackBar—a cylinder similar to an abacus bead, that you slide and rotate—is awkward to use, since you move it a different amount horizontally than vertically to move the pointer the same distance. This makes diagonal movements difficult without much practice. I would strongly prefer a clip-on, side-mounted trackball, or even a trackball mounted below the spacebar, like the trackball on the PowerBooks. When you have room to spread out, you can connect a real mouse to the ADB port and avoid the TrackBar.

Mix and Match

Perhaps the Outbound notebooks' best feature is their upgradability. You are not stuck with a predetermined configuration. If you want to change the CPU, you can have your dealer do it. If you want to add a math coprocessor to an 030- or EC030-based system, you can. Unlike with Apple, you don't have to buy a new notebook with the configuration that most closely matches what you want.

MARK JOHANN



Outbound Notebook System 2030

The CPU choices range from a 16MHz 68000 to a 33MHz 68030. System RAM can be 2MB or 4MB, and you can have up to 64MB of RAM on an 030-based system by using the newer 16-megabit SIMMs. And 030- or EC030-based models support a 68881 math coprocessor.

The Outbound also supports larger-capacity hard drives than the PowerBooks do. Hard drives are available in capacities from 20MB to 60MB; a 120MB drive is expected early next year. You can also get a model with no hard drive at all.

Connections

The Outbounds offer the connections you would expect on a Mac: ADB, 25-pin SCSI, audio in/out, and two RS-422 serial ports. There is also a built-in microphone and speaker. You can buy a high-price ($279), low-weight (2⅖ ounces) 2400-bps Hayes-compatible PocketPort modem that fits in an internal slot.

But the Outbounds lack a video-out port to drive larger or color monitors. Fortunately, there are third-party workarounds, such as Aura Systems' ScuzzyGraph eight-color (3-bit) SCSI interfaces, which cost between $695 and $895, depending on the monitor used. Supported monitors include color and monochrome Macintosh monitors up to 19 inches, as well as VGA monitors.

Are They Worthwhile?

Outbound's notebooks are solid machines and deserve serious consideration by anyone contemplating buying a Mac notebook. Apple's offerings are not especially better or worse, so less tangible factors become important in choosing among the options.

If your foremost consideration is price, Outbound loses. A System 2000 with a 20MB hard drive and 2MB of RAM costs $2899, while a System 2030 with a 40MB/4MB configuration costs $3999. That's about $500 and $600 more, respectively, than comparable notebooks from Apple.

The Outbounds' real value lies in the ability to be upgraded, so you have to weigh whether the higher initial price will pay off in the convenience and savings of not replacing the machine later. The other factors that may tilt you in Outbound's direction are the feel of the keyboard and the larger display, assuming you aren't completely turned off by the TrackBar.—**Galen Gruman**

See **Where to Buy** *for contact information.*

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E-Mail Program and Group Scheduler

WORDPERFECT OFFICE 3.0

Pros: Can create mail off-line; mail includes personal address book and spelling checker; message can be encrypted and assigned a security level; custom forms; forms editor supports color forms; notebook DA handy for storing small databases. **Cons:** Gateways still require PC-based server; File Manager Find File feature too restricted. **Company:** WordPerfect Corporation. **Requires:** Mac Plus; LocalTalk, EtherTalk, or AppleTalk network. **List price:** $149; 5-pack $495, 20-pack $1495.



WordPerfect Office is version 3.0, despite this being the first release. The company decided to use the same version number for its PC and Mac versions of WordPerfect Office, partly to indicate that they can work together. Mac users can access resources on both Mac and PC servers and exchange mail and schedules with PC users. Gateways to other E-mail systems and fax modems must still be installed on a PC-based WordPerfect Office server.

The WordPerfect Office server can be installed on a workstation or an AppleShare server; however, the administrator's manual doesn't clearly explain how to install the software on an AppleShare server.

Getting the Mail Through

The heart of WordPerfect Office, electronic mail, is used by both the WP Mail and WP Calendar desk accessories. The WP Mail DA lets you send messages with up to 100 enclosures to anyone listed on the WordPerfect Office server, or to special addresses contained in your personal address book. Special addresses can be used to send messages over gateways and other servers and can include fax telephone numbers and a fax cover-page selection.

WordPerfect Office allows you to create messages even when you are not connected to a server—for example, if you are using a portable computer outside the office. You can save the messages and send them when you connect to the server. However, you can only use addresses that have been saved in your personal address book, or you must wait till you connect to the server to address the message.

You can assign a security label to any message—the choices are Normal, Proprietary, Confidential, Secret, Top Secret, and For Your Eyes Only. And although there's no direct relation between the security label and encryption, you can encrypt any message so that only the recipient can read it, even if it's intercepted by someone else. And you can conceal the subject of any message.

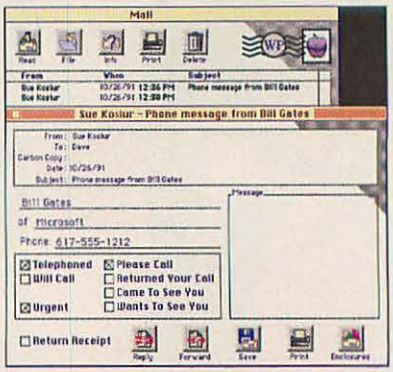
I have always wanted electronic-mail applications to include a spelling checker, and at last WordPerfect Office does. Unfortunately, this adds another spelling-checker dictionary to my system—and I already have three on my Mac!

Scheduling

The WP Calendar DA can be used as a personal scheduler as well as for scheduling meetings with other WordPerfect Office users. The DA opens to the day-at-a-glance view, but you can easily switch to a one-week or one-month view. Both week and month views show the essential schedule information, but you have to switch back to the day view to make changes. The WP Calendar DA can also be used for to-do items, and each to-do item can be prioritized.

The WP Calendar DA schedule form includes fields for meeting attendees as well as resources, such as rooms and projectors. WordPerfect Office can scan everyone's schedule for a free time slot, or you can check the schedules yourself—in either case you can see that an appointment has been scheduled, but you can't see the appointments themselves.

WordPerfect Office, of all the group-scheduler programs I've reviewed (the other two are Microsoft Schedule+ and Meeting Maker; see *Macworld,* November 1991), has the most flexible printing capabilities. WordPerfect Office lets you customize any WP Calendar output form. Unfortunately, the program doesn't include enough predefined examples.



Checking the Mail The WP Mail DA has an easy-to-use interface. Message types (memo, phone, and so forth) are indicated by the icons to the left of each message; grayed icons have already been read. The window in front is the phone-message form, showing buttons for possible actions (reply, forward, and so on) at the bottom of the window.

Rounding Out the Product

The WP Forms Maker application lets you create custom mail forms and custom notebook forms, as well as forms for printing your calendar.

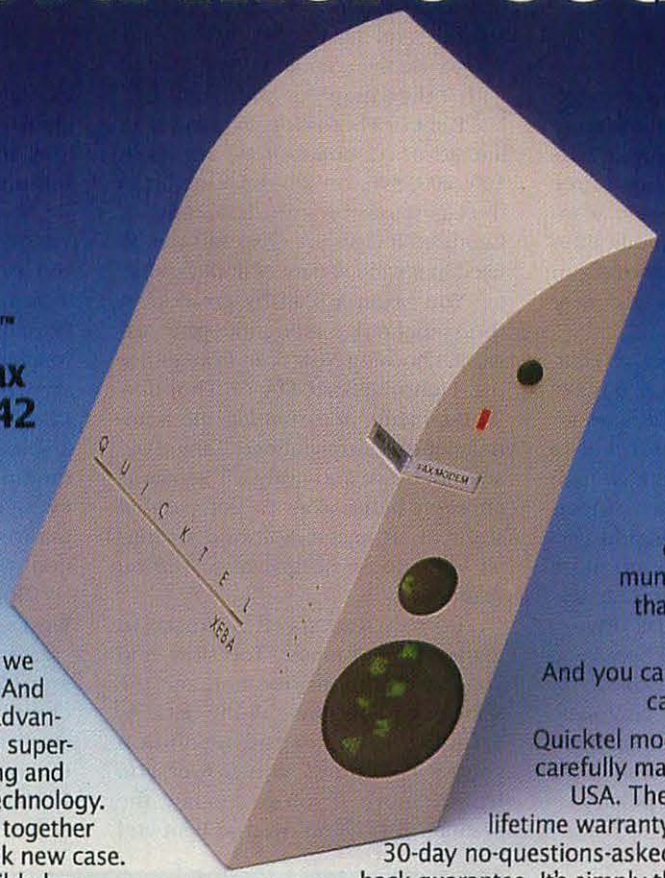
WordPerfect Office's WP NoteBook DA is a handy utility that allows you to set up small databases for collecting information such as phone numbers and addresses, the contents of your disks, or notes on articles you've read. Notebooks can contain graphics as well as text, and if a notebook field contains a phone number, WP NoteBook can dial the number for you. Although it includes sorting and record-marking for retrieving information, WP NoteBook is not a substitute for a full-fledged database.

The File Manager DA lets you copy, move, and delete files; create a new folder; search for a file by name; and search for text within a file (searches are rather slow); but there are utilities that offer more features. For example, CE Software's DiskTop lets you search by the file type, the date created, or the creator.

WordPerfect Office is a robust E-mail system with group scheduling and a handy information-database DA. The program currently offers both Mac and PC clients and servers, and it will soon offer VAX-based and Unix-based servers and clients. It's been a long time coming, but WordPerfect Office for the Mac looks like it's been worth the wait.—**Dave Kosiur**

See **Where to Buy** *for contact information.*

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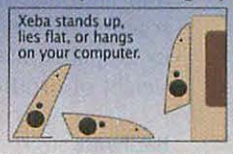
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LIGHTNINGSCAN COMPACT

Pros: Inexpensive; portable; good joining tools; image-editing software included. **Cons:** Limited gray-scale abilities; port interface blocks external video port. **Company:** Thunderware. **Requires:** Mac Classic (any Mac with SuperDrive); 1MB of RAM; System 6.0.2. Recommended: System 6.0.7. **List price:** $359.

Back in 1984, Thunderware brought out ThunderScan, a kludgey but ingenious cartridge that turned an ImageWriter into, of all things, a gray-scale scanner. A similarly ingenious modification to its own popular LightningScan hand-held scanner yields the new LightningScan Compact.

The major innovation was to eliminate the SCSI controller box, a bulky device that sat between the scanner and the Mac, and replace it with a disk-port interface that's sleek enough to plug directly into the Mac's SuperDrive port—no more SCSI-address-and-termination headaches, no more AC transformer. A pass-through lets you connect an external disk drive.

Software tools help you overcome the limitations of the 4.2-inch swath. And although not a true gray-scale scanner, the Compact yields fair-quality gray-scale files through a software sleight of hand called interpolation.

Hardware

The scanner is designed with the Mac Classic, SE, and Portable in mind—any Mac with a SuperDrive port. (The LightningScan Compact requires an optional, low-price cable and a free software upgrade to work with the Mac IIsi.) The rounded back fits comfortably in the hand, and a see-through window lets you view an image as you scan. A snap-on plastic guide and wooden straightedge aid in making straight scans, especially valuable when you need to join multiple files. The scan unit has four simple controls: brightness, resolution, dithering and halftone settings, and start/stop.

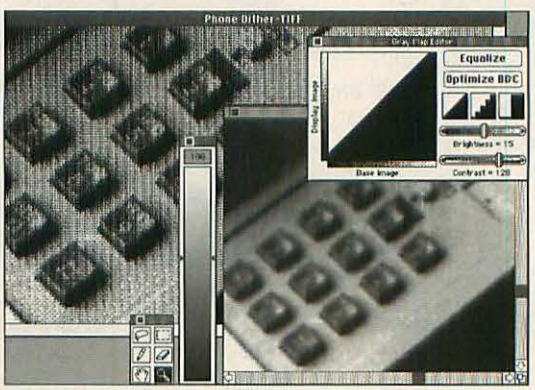
Unfortunately, if you want to connect both a LightningScan Compact and a gray-scale monitor to an SE/30, you are out of luck. The interface is just tall enough to cover the port for an add-on video board, making that port unusable for the time being. But take heart—even if you don't have a gray-scale monitor, the software allows you to work with and output gray-scale files anyway.

Scanning

The LightningScan comes bundled with ThunderWorks image processing software and a handy DA that enables you to use the scanner in conjunction with other graphics programs like MacPaint or Photoshop. You can scan line art or continuous-tone images at 100, 200, 300, or 400 dpi. Line art is the LightningScan's greatest strength. Captured images are crisp and can be used in a wide variety of applications.

You begin a scan by positioning the straightedge alongside your artwork, choosing New Scan from either the LightningScan DA or ThunderWorks menu, and running the scanner along the straightedge. Taping the artwork down and using a T square is an even better way to get parallel scans of an image. Software settings let you choose horizontal or vertical scanning.

Correct scan speed is crucial to getting a good image. Too slow, and you get distortions; too fast, and the scanner can't capture all the data. As a rule, the higher the resolution you're working at, the slower you have to move. If you go too fast, the scanner displays an overrun light and



Gray-Scale Interpolation This image was scanned as dithered line art in ThunderWorks at 400 dpi and then converted to gray scale, reducing the file size from 121K to 23K. The ThunderWorks software includes respectable image processing capabilities.



JOHN WALLNER

LightningScan Compact

the Mac emits a buzzing noise (the buzzer is much more sensitive than the light). If you don't slow down immediately, the scan stops automatically and gives you the option of restarting the scan or quitting.

The DA offers a limited set of ThunderWorks' features. For example, you can rotate a scan in 90-degree increments and flop it vertically and horizontally, but there are no retouching tools. You can copy from the scan to the Clipboard, but Cut and Paste are disabled. The ability to save a selection is useful for eliminating unwanted portions of a scan; however, if you accidentally close an unsaved image there's no Cancel option—just Save or Don't Save.

Both the DA and the ThunderWorks software use interpolation to create gray-scale files from the initial scan. The LightningScan Compact doesn't actually record gray values; instead, dither patterns work together to create the impression of grays. During interpolation, the software reverses this process by counting the dots in a 6-by-6-pixel sample and replacing the dither pattern with one gray value, yielding 36 shades of gray, plus white—not enough for high-quality gray-scale images, certainly, but adequate for many purposes. Interpolation also reduces file size because fewer pixels are required to display the image. Setting the scanner to its highest resolution and finest dither settings ensures that you capture

(continues)

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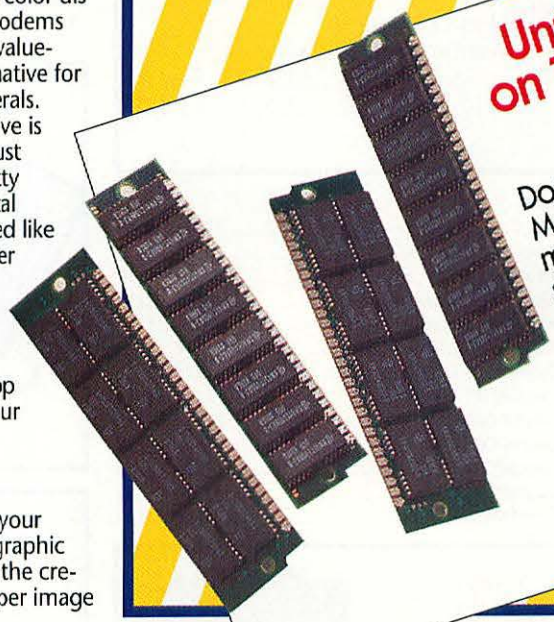
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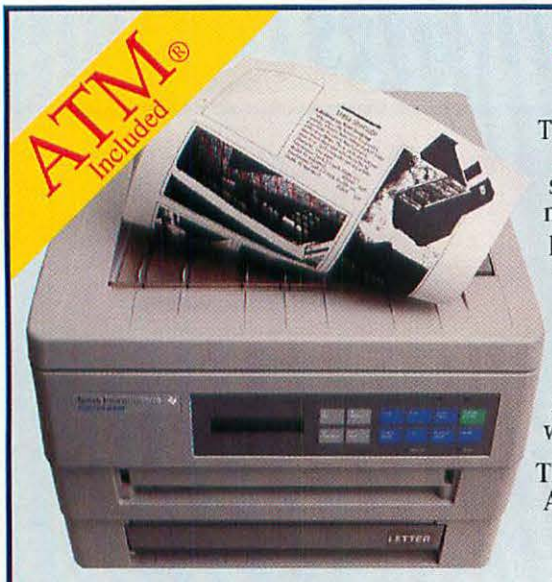
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Protegé 2400 External w/ SW *22315* $99
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RasterOps 24XLi *23561* $2649
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Microsoft		
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Seikosha Personal Printer
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White Knight II	*27664*	$89
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Prodigy Startup Kit	*27726*	$27
Sitka		
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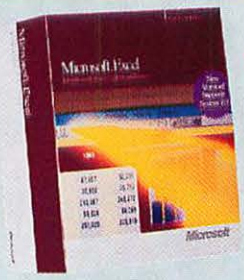
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the most information possible, making for the best interpolation.

ThunderWorks and Skoogy

ThunderWorks has most of the standard image processing features found in more-expensive packages, including filters that darken, lighten, add noise, diffuse, add relief, sharpen, and smooth. It adds the estimable Skoogy and Pushpin, two tools to help rectify those maddening alignment problems that crop up when you go to join two scans. The Skoogy lets you stretch or compress the right-hand image to match the left. When you get one portion aligned the way you want it, you place a Pushpin to fix it, and work your way along the seam. Hint: if you're joining gray-scale files, wait to Skoogy until after interpolating; otherwise, you're likely to get streaks in the image.

The LightningScan Compact lists for $359, which means you can probably find it for under $300. Thunderware's tech support is easy to reach and very helpful. With excellent line-art and dithering capabilities, and adequate gray-scale interpolation, plus a low price, ease of use, and many file and printing options, the LightningScan Compact constitutes a good value.—**Matthew C. Nielsen**

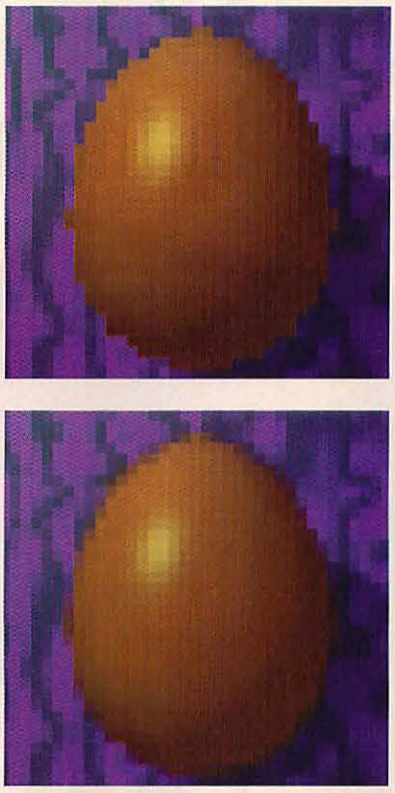
See **Where to Buy** *for contact information.*

Antialiasing Utility

JAG 1.0

Pros: Antialiases PICT and PICS graphics from any application; better antialiasing than many high-end graphics packages; easy to use. **Cons:** Can't select areas of images to work on. **Company:** Ray Dream. **Requires:** Mac Plus; 2MB of RAM; System 6.0.5 (System 7–compatible); hard drive. Recommended: Mac II; 8-bit or 24-bit video board. **List price:** $99.95.

Despite the Mac's graphical talent, many Mac images still suffer from jaggies—those ragged, stair-step edges that give images a distinctly computer-generated look. If jaggies plague your projects—be they animations, paint images, or 3-D models, Ray Dream's JAG (Jaggies Are Gone) offers an efficient and inexpensive solution.



Before and After In seconds, JAG enhanced the realism of this egg, shown here at 400 percent. Note the blending at the tip of the egg and in the shadow (antialiased image, bottom).

JAG's sole job is antialiasing. That is, it detects rough edges in graphics and then smooths them by selectively recoloring pixels. The process actually blurs and softens edges rather than creating sharp, clean lines, but the results are almost always preferable to the jaggies.

JAG is handy for two types of Mac artists. First, it's a boon for those who work with graphics packages, such as PixelPaint, Studio/8, MacPaint, and Canvas, that have no built-in antialiasing. But it's also a valuable companion to high-end applications that do include antialiasing, such as Photoshop, ColorStudio, and Swivel 3D. JAG's antialiasing algorithms produce slightly more accuracy and greater overall speed.

Part of JAG's charm is its simplicity. After launching JAG, choose Open from the File menu and select any 8-bit or 24-bit PICT or PICS image created in another application. When JAG displays the image, another menu selection prompts JAG to antialias the art on screen—a job that takes between 10 and 60 seconds, depending on the image's complexity; you can also antialias files in batches. Save a newly polished graphic as a PICT or PICS file, and it's ready for final output to paper, film, video, or whatever medium you're using.

It's this quick, one-pass approach that makes JAG stand out. Photoshop and ColorStudio, for example, let you set tools to antialias while you draw, but if you bring in art from another source—a scanner or another graphics package, for instance—or if you want to antialias your work after the fact, you're out of luck.

Blend and blur tools approximate antialiasing by softening edges where contrast is too great. Unfortunately, this tactic sometimes blurs edges you want to keep sharp, compromising the image quality and requiring time to fine-tune the blur. JAG's color-detection algorithms limit antialiasing to sharply contrasting edges, and spare you any fine-tuning. Your only decision is whether to exclude antialiasing on thin lines, small text characters, and lone pixels that might blend into the background. Text sometimes loses clarity even with this option turned on; it would be nice to be able to select areas of an image for antialiasing.

Finally, if you ordinarily antialias within CAD and 3-D modeling programs such as Swivel 3D and Ray Dream Designer, JAG can save you time. These applications antialias using calculation routines that can significantly slow the Mac rendering 3-D graphics. Instead you can render the CAD images without antialiasing and then send the finished graphics through JAG for a quick sprucing up.

JAG's value boils down to convenience. Technologically it doesn't offer anything new—a host of other applications either support antialiasing or manage makeshift workarounds. But JAG's ability to quickly antialias entire otherwise-finished images in one fell swoop saves lots of time. This, plus its easy operation and moderate price, make JAG worthwhile for anyone whose mainstay is polished Mac graphics.—**Helmut Kobler**

See **Where to Buy** *for contact information.*

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Circle 295 on reader service card

Draw Program

MICHAEL'S DRAW 1.0

Pros: Special organizational capabilities; flows text into multiple columns; binds text to curve; color mixing effects; inexpensive. **Cons:** No bezier curves; kerns bound text only; can't edit bound text; transformations inapplicable to some objects; extremely complex scripting. **Company:** Event One. **Requires:** Mac Plus; hard drive. **List price:** $149.99.



Michael's Draw is as weird as it is wonderful. Here is an unusually inexpensive drawing application (less than half the price of MacDraw Pro) that provides fundamental graphics capabilities along with a few high-end features found in no other draw program—not Aldus FreeHand, not Adobe Illustrator, not Canvas. Best of all, Michael's Draw works without a glitch, a rarity among newcomers to the drawing software market.

The catch is the strange interface. Half the tool icons look utterly unlike those in any other program. Menu commands are scattered all over the place. And even the simplest operations demand some time spent with the manual.

Out in the Projects

Product illustrators, presentation designers, and others who create groups of drawings will like the Projects feature, which enables the user to restore the work space from a previous session. When you save a project, Michael's Draw records the physical appearance of all open documents (the documents themselves are saved to disk independently). Then when you reopen a project, each component document opens, its window scaled and positioned just as it was when the project was saved (see "Variations on a Project").

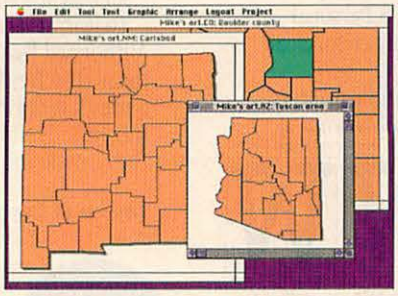
Michael's Draw supports up to 8000 drawing layers and an equal number of custom views. For example, you might create several custom views that expand the current drawing to 400 percent, each scrolled to a different detail. Each layer and view can be assigned a keyboard command for quick retrieval.

Underground Ups and Downs

Most striking is how Michael's Draw compares with the low-end standard, MacDraw Pro. Certainly MacDraw Pro excels in certain areas: it provides bezier curves, automated gradations, and a built-in spelling checker, none of which Michael's Draw has. Also, MacDraw Pro's slide-show feature is more sophisticated.

But Michael's Draw provides a surprising assortment of features that MacDraw Pro still lacks. Take text, for example. Michael's Draw is the only draw program except Adobe Illustrator that can flow text into multiple columns, which can be of any shape or size. You can fit text to a curve and manually kern it to avoid overlapping or spreading characters. But once text has been flowed or bound, you cannot edit it or the graphic object without separating them. Nor can you kern standard text blocks, which limits the program's potential for creating display type.

Michael's Draw beats MacDraw Pro for transformation features, including tools for slanting objects and simulating perspective. Unfortunately, these cannot be used on text. One interesting function—which can be applied to text—creates a series of copies of a selected object, scaling and rotating each copy by user-defined increments. Michael's Draw can also condense and expand text if you first attach it to or flow it into a graphic object, something MacDraw Pro cannot do. A submenu of blend commands can be used to color objects with intermediary shades. Unlike Adobe Illustrator and Aldus FreeHand, which blend by composing transitional shapes, the blend commands in Michael's Draw affect the fill and outline attributes of selected objects only.



Variations on a Project Michael's Draw allows you to save open document windows, their relative positions, the view sizes, and the current preference settings to a special project file.

Finally, Michael's Draw provides three unusual tools that enable you to copy an object from one open document to another without using the Clipboard, replace all selected objects with a designated object, and grab attributes from one object and apply them to another by simply pointing and clicking.

Crossover Capabilities

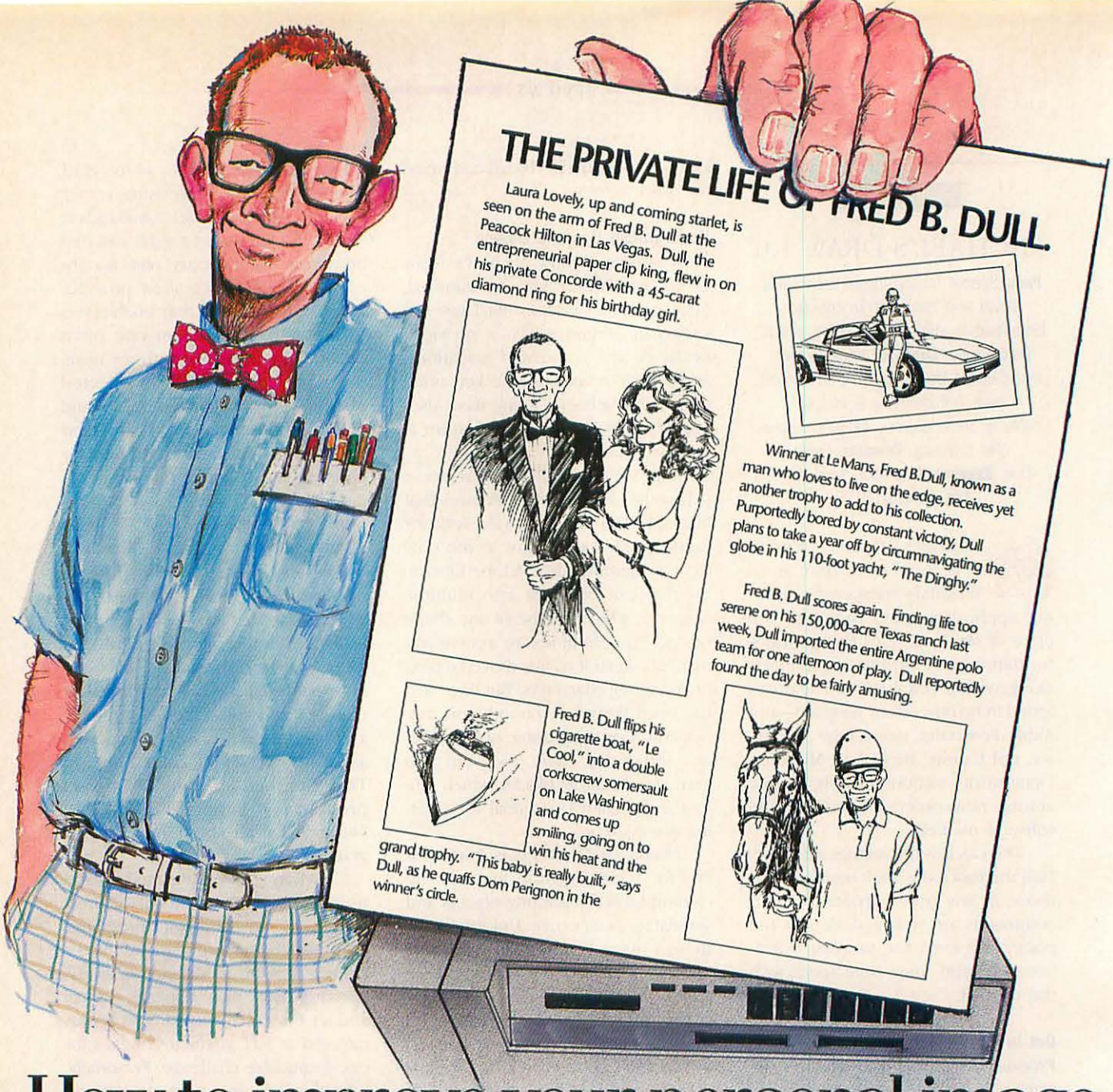
What truly distinguishes Michael's Draw—and ultimately sends it spinning head over heels into the exclusive realm of hackers—is its scripting feature. Scripting allows you to combine objects on separate layers to create unusual effects that, while they neither display on screen nor print to a PostScript printer, can be exported as antialiased 24-bit color bitmaps. They can then be edited in a paint program or imported back into Michael's Draw to be printed or integrated into a drawing.

In theory, scripting enables the user to combine some of the best features of draw and paint programs. In practice, scripting in Michael's Draw is roughly as difficult as in HyperCard. This, plus a sparse manual and an on-screen tutorial that seems targeted at MIT graduates, makes for one formidable challenge. Personally, I'd rather rely on a paint program to create full-color bitmaps. It lets me see what I'm drawing, and with practice I daresay I can create every effect that Michael's Draw scripting permits.

On the other hand, most professional paint programs run $700 or more, which brings me to the moral of the story. Michael's Draw makes sense for MacDraw users who want to round out some of that program's deficiencies. Users with more money can buy a high-end draw program and a 24-bit paint program and avoid a lot of headaches. But if you're tight on cash and big on brains, Michael's Draw delivers artwork as it puts the screws to your thinking cap.

Now, where did I put that Ibuprofen?—**Deke McClelland**

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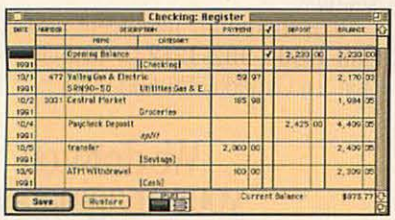
Pros: Inexpensive; easy to use; powerful financial-management tools, such as flexible budgeting, ability to export to tax-preparation packages, and electronic bill-paying; excellent documentation. **Cons:** Doesn't easily track assets besides cash; no invoicing or financial calculator. **Company:** Intuit. **Requires:** Mac Plus; System 6.0. **List price:** $69.95.

Quicken, the best-selling financial-management program for the Mac, just got better. Version 3.0—the last version was 1.5—provides new and improved features but keeps the same, easy-to-use interface.

Quicken is essentially a computerized checkbook: you record checks in a window that resembles an actual check form, and deposits in a window that resembles a register.

Quicken stores financial information in a simple database and provides reports that make it easy to tally tax deductions at the end of the year, estimate net worth, and track spending. Quicken also provides easy-to-use report filters for customized reports.

Despite the simplicity of the program, you can store very detailed transaction information. For example, a check written to pay your American Express bill can be categorized as being part business expense, part entertainment expense, and part clothing expense. With a feature called Subcategories, each of these expense categories can be further broken down. The entertainment-expense category might be subdivided into restaurant, movie, and sporting-event expense subcategories.



The Register Window The Register window is central to Quicken. It acts as a repository of the financial information you enter and shows the current account balance.

The Classes feature provides another way to organize data. For example, a real estate investor might not want to keep track of income and expenses just by categories such as rent, utilities, and repairs. With Quicken, he or she can also keep track of income and expense items by property—the condo on Baltic Avenue, the house on Elm Street.

Quicken offers time-saving tools, too. The recurring-transactions feature lets you maintain a list of frequently entered transactions, such as the monthly rent check and the semimonthly payroll deposit. The Billminder keeps a tickler file of your bills. This handy feature keeps you from inadvertently paying bills late.

Although I did not try this feature, Quicken 3.0 supports the CheckFree electronic bill-paying service. You agree to let the CheckFree service deduct money from your checking account. Then, whenever you have a bill to pay, you send the necessary payment information to the CheckFree people via modem. The company pays the bill and deducts the check amount, plus a small service fee, from your account.

Quicken 3.0 also makes it easier than ever to prepare income taxes. As long as you've recorded income tax deductions in Quicken, you can export a file that summarizes this deduction information to popular tax-preparation packages like MacInTax and TurboTax. And even if you don't use MacInTax or TurboTax, Quicken does most of the hard work by preparing a report that summarizes your income tax deductions.

Like most checkbook programs, Quicken lets you track things besides bank accounts. Using the basic data entry windows, you can track credit cards, assets other than bank accounts, and liabilities such as a car loan or mortgage. Even credit card tracking is smooth and intuitive.

In general, however, record-keeping for other assets and liabilities isn't Quicken's strong suit. Quicken only tracks dollars. For example, you can track the value of stock you own, but you can't track the number of shares. Another consideration is that Quicken limits you to 256 accounts. That seems adequate, but each asset or liability you track is considered one account. So if you are an active investor or run a business, you could quickly use all 256 accounts.

Quicken's manual is easy to read and useful. In most cases it explains not only the mechanics of how to use the product but also the procedures. For example, the chapter on business uses describes how to track accounts payable and accounts receivable and how to process payroll.

Who should use Quicken? Any businesses or individuals who want to automate their checkbooks and track income and spending. My guess is that most of the people who think they want more than this really don't. In most cases, Quicken's simplicity and ease of use outweigh its limited functionality.—**Stephen L. Nelson**

See **Where to Buy** *for contact information.*

3-D Rendering/Animation Program

ELECTRICIMAGE 1.0

Pros: Beveled 3-D PostScript fonts; extensive file-import/export capabilities; superb automated animation capabilities; fast, high-quality, reliable rendering. **Cons:** Expensive; hardware copy protection; no modeler; lacks shadows, ray tracing, and polymorphic tweening; confusing documentation. **Company:** Electric Image, Inc. **Requires:** Mac II with math coprocessor; hard drive; 4MB of RAM; color monitor; 3-D modeling program. **List price:** $7495.

ElectricImage, a professional-quality three-dimensional animation and rendering system, is not for everyone. In fact, with its $7500 price tag, the program is specifically geared to users who currently rely on dedicated systems that cost up to ten times that amount.

Electric Anatomy

The ElectricImage package includes five independent applications: the Transporter conversion utility; Mr. Font, for enhancing characters set in

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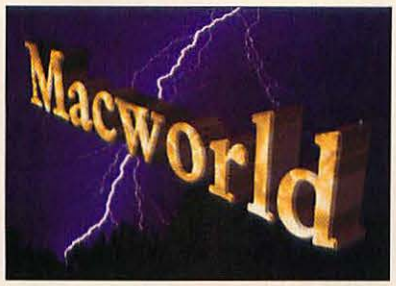
a PostScript typeface; the ElectricImage animation program; the Camera rendering system; and Projector, for viewing and exporting finished sequences. The package lacks a modeler. Thus, for all graphic objects used in ElectricImage, you must define and save wire-frame constructs using a separate modeling program, such as Swivel 3D or DynaPerspective. You then convert the objects to ElectricImage's native Fact format using the Transporter utility, which reads more than 20 different formats, including Swivel 3D, Super 3D, DXF, 3DGF, and Wavefront. Transporter also provides an option to clean up imported data, such as combining duplicate polygons and merging points, and an option to control how data is output.

The Mr. Font utility provides another approach to modeling. It converts any text set in a PostScript Type 1 font into a 3-D model, complete with beveled corners if you so desire. You can then animate and render this text as a solid object using ElectricImage and Camera or save it to disk in one of eight popular 3-D formats and then edit it using a separate modeling program.

The largest of the five applications, the ElectricImage application serves to position and move models in three-dimensional space. Immediately after you create a new project file, four windows appear showing top, front, and side views of an imported model, along with a camera view. You can alter camera and light positions by dragging icons in the top, front, and side view windows.

ElectricImage provides five different styles of lighting—ambient, artificial, sunlight, spotlight, and fixed-camera light—but oddly, none of them cast a shadow. (Shadows will reputedly be added in the upcoming version 1.1.) You can control light characteristics such as intensity; range; and Cone Angle, which determines the arc of the wedge-shaped ray cast by a spotlight.

You can move, scale, and rotate models independently or link them with other models. Models can also be positioned to a background image, allowing you to align foreground objects to imported artwork. In addition to the standard black-and-white or full-color bitmap, the background image can be a movie file that changes incrementally with each frame, creating the effect of the camera moving with the foreground objects rather than remaining fixed. You can use a live-action sequence as a template for your models, a technique known as *rotoscoping*, or merge models and live action, as was demonstrated in the playground holocaust sequence in the movie *Terminator II*. In fact, ElectricImage was used for *Terminator II*.



A Very Deep Message Based on the Adobe font Stemple Garamond, these letters were beveled, given depth, and converted to a model using the Mr. Font utility. Light source, perspective, and a yellow cloud texture were added using the ElectricImage application. The final image—which required no ray tracing—took approximately ten minutes to render on a Mac IIci, considerably faster than on competing rendering applications.

To animate an object, you add a new key frame to the project file, and move, scale, or rotate the object within the frame. A line connects the original position of the object to its new position. ElectricImage automatically creates intermediary frames during the rendering process. You can also assign animation paths to other elements in the project file, including lights and cameras. When a model or element is moved over three or more key frames, the animation path forms a spline, which smooths the motion. You can also control the velocity of an object between key frames. To check an animation, you can preview the movement of the wire-frame models in the camera-view window, with or without background images.

I was dismayed that ElectricImage offers no *polymorphic tweening*, which allows one model to melt into another over time. According to Electric Image, Inc., an undocumented feature allows you to cycle through a group of models, one for each frame.

Textures and Rendering

For a rendered image to look real, a model must be assigned textures and reflections. ElectricImage is capable of loading bitmapped files—once they're converted to ElectricImage's special Image format using the Projector utility—and mapping them onto 3-D surfaces. The program allows two texture maps and one reflection map per object. Each map can include alpha-channel pixels, which let background video images show through when the final sequence is displayed.

The only maps supplied are the ones included with tutorials. If you want maps, you must create your own or purchase a $99 demo CD ROM disc from ElectricImage that contains several sample images, including textures and reflections.

When you've finished positioning models, applying textures, and so on, you're ready to proceed to the Camera program to render your artwork. The Camera program is superb and easy to use, rendering many times faster than other programs using similar options. The image quality is extraordinary, especially the anti-aliasing. Best of all, Camera is reliable. I experienced no strange *z*-plane clipping, no unexpected static, no disappearing details—in short, none of the problems I have encountered in other rendering programs.

Images can be rendered as large as 16,000 by 16,000 pixels. You can also create interlaced images for smoother transfer to NTSC video. Shaders include wire-frame, flat, Gouraud, and Phong shading, but no ray tracing.

While the image is being rendered, the program provides vital statistics about the process, including rendering time, disk space needed, disk space remaining, and facet and coordinate information. For long rendering processes, Camera even tells you what time and which day of the week the sequence will be completed.

The Projector utility, the image-management tool, automatically opens when rendering is complete. Projector enables you to view images and movies on any monitor. It compiles movies into significantly smaller Fast files, which play the animation

(continues)

sequences at up to 60 frames per second. The actual speed varies depending on the changes between each screen. Most of my animations ran at about 20 frames per second.

Projector can also convert images between six different file formats—Image, PICT, PICS, Targa, Abekas, and IFF (import only). Projector fully supports numbered, sequenced PICT files, helpful when using other rendering systems in tandem with ElectricImage.

Phooey on Value

ElectricImage is one of those amazing graphics applications that make you glad you own a Mac. Granted, it packs the power of a professional animation system into the down-home, gee-whiz world of personal computing. But for $7500, the application is *all* you get. The manual is embarrassingly deficient and remarkably confusing. The page numbering doesn't even make sense (page T6-5 is followed by EIR-35, which comes shortly before TMR-5). The index offers 11 lighting references (none of which direct you to the essential introductory light discussion on pages LR-1 through LR-3), 9 of which begin with *LightSource,* a term that is missing from all but one lighting dialog box in the program.

Now for the really bad news: ElectricImage is copy protected with a hardware device called Eve II that plugs into an ADB port. None of ElectricImage's five programs will load if this device is not plugged in. Thankfully—Electric Image, Inc., sells a special Eve II device that allows you to use only the Camera rendering program for $1495 per machine, making the scant device roughly worth its weight in gold.

The news becomes grimmer. After the 90-day warranty period has passed, you can look forward to about another $1000 per year "subscription fee" for updates and information. If you don't subscribe, upgrades cost approximately $2500 each. Electric Image, Inc. claims, however, that the upcoming version 1.1 will be shipped for free to all registered users by the end of the year.

So there it is. ElectricImage is an excellent system for quickly creating advanced three-dimensional animations if you're a member of the Fortune 500. Knock the price down to $2500; remove the copy protection; rewrite the manual; include a couple of disks of sample textures, reflection maps, and animation sequences; and you'd have yourself one of the best animation programs on the market.

—Deke McClelland

See **Where to Buy** *for contact information.*

Add-On Modules for After Dark

MORE AFTER DARK, VOLUME ONE

Pros: Modules can be combined; fun to watch. **Cons:** Fun to watch. **Company:** Berkeley Systems. **Requires:** Mac 512KE; System 4.1 (System 7–compatible); System 6.0.3 for sound; After Dark 2.0. **List price:** $39.95.

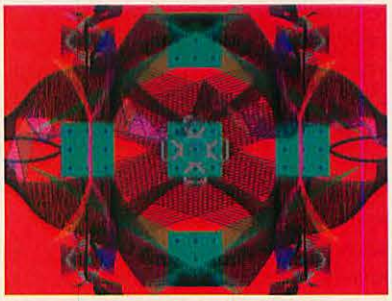


If you're the type who takes a utilitarian, no-frills approach to life, then After Dark probably isn't for you—a number of public domain utilities will do the job just as effectively. But if you appreciate an entertaining diversion now and then, check out Berkeley Systems' delightful collection of screen savers.

Etched in Glass

Although some experts contend that burn-in isn't a problem on the Macintosh, on-screen images left unaltered for hours can become indelibly imprinted onto a monitor's phosphor coating. (Once, years ago, I came upon a roomful of computer terminals, all screens showing the same logo—and none of them were even turned on. Not a pretty sight.) Software like After Dark can prevent burn-in by changing the display after a specified period of inactivity, returning to the original screen when you press a key or touch the mouse.

In case you become bored with the original After Dark, Berkeley Systems has released More After Dark (MAD) with 26 add-on displays. (MAD comes with an application that updates earlier versions of After Dark 2.0 to ensure compatibility.) MAD displays include Lunatic Fringe, a shoot-'em-up space game; Virex-D, a module that scans for (but doesn't repair) viruses; and my favorite, Boris, the screen saver for cat lovers. Mowin' Man (he keeps the grass from growing too thick), Nocturnes (glowing eyes in the forest at night), and Confetti Factory (hard to explain, but the ducks are cute) are other surefire crowd pleasers. If these still aren't enough, After Dark's MultiModule feature lets you run more than one module simultaneously, at the expense of slower animation.



Digital Tapestries Combining Stained Glass, Mountains, Spiral Gyra (three new MAD modules), and Nightlines in After Dark's MultiModule can produce striking designs like this one.

Time to Sleep

The amount of idle screen time required before After Dark automatically activates can be varied between 1 and 999 minutes. You can also make After Dark kick in immediately by placing the cursor in any specified corner of the screen, or you can keep After Dark from engaging by positioning the pointer in another corner. To prevent After Dark from degrading system functions like printing and downloading, an optional feature prevents activation when traffic is detected on either serial port, or if CPU or disk access is above a certain threshold.

I listed "fun to watch" as both a pro and a con in the summary at the beginning of this review. No, that's not a typo—some of After Dark's modules are so entertaining to watch that they're downright distracting at times. In fact, many are a lot more interesting than the documents and applications they're designed to hide. But that's a penalty I'll gladly pay.

—Franklin Tessler

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Bible Software

MACBIBLE 2.5

Pros: Performs extremely complex searches; supports Hebrew and Greek texts; displays Bible text according to user-defined formatting; fast. **Cons:** No Bible-study guides, supplements, or cross-reference materials. **Company:** Zondervan Electronic Publishing. **Requires:** Mac Plus (System 7–compatible). Recommended: Hard drive. **List price:** $129.95; Hebrew Bible $199.95; Greek New Testament $199.95.

HYPERBIBLE 2.0

Pros: Extensive cross-references and other Bible-study aids. **Cons:** Poor display of Bible text; multitude of HyperTalk programming errors; slow and cumbersome installation procedure; only two Bible translations available; requires large amount of space on hard drive. **Company:** Beacon Technology. **Requires:** Mac Plus; System 6.0.5 (System 7–compatible); hard drive with 10MB of free space. **List price:** $199.

VERSE SEARCH 5.0

Pros: Provides transliteration of Greek and Hebrew Bible words; built-in Bible dictionary and thesaurus; permits use of four translations; good note-taking and indexing features. **Cons:** Modules must be purchased separately; slow access to verses during searches. **Company:** Bible Research Systems. **Requires:** Macintosh 512K. System 7–compatible. **List price:** $99.95; Greek and Hebrew transliterator modules $99.95 each; other add-on modules $49.95 to $99.95 each.



Studying the Bible is no small task. Part history, part poetry, part prophecy, the Book of books is an imposing document containing more than 31,100 verses of text. But with a Macintosh and the right Bible-study software, the Bible can be an open book to casual readers and serious scholars alike.

macBible

The heart of macBible is its fast and flexible text-retrieval system. Using the logical operators AND, OR, and NOT, macBible lets you conduct complex word and phrase searches with remarkable speed. Wild cards can be used to find all the variations of a given word. The list of possible combinations is almost endless, and macBible performs each search with ease and speed.

Flexibility is macBible's hallmark. Menus allow you to alter the size and spacing of Bible text. You can separate individual verses with a blank line, or view text in continuous blocks. Up to nine windows can be stacked or tiled. Keyboard shortcuts make searches go even faster.

With at least 2MB of RAM, you can run more than one version of macBible, allowing you to compare English translations, or look at English, Greek, and Hebrew versions simultaneously. The Greek and Hebrew versions come with the fonts needed to produce great-looking text, and you can perform the same complex searches in those languages.

macBible is available in four English translations: the King James, Revised Standard, New Revised Standard, and New International versions. Modules containing the New American Bible, New International Version Study Bible, Revised Standard with Apocrypha, the Hebrew Bible, and the Greek Septuagint should be available by the time you read this.

HyperBible

HyperBible 2.0 is intended to be a complete Bible-study package. The massive HyperCard-based program (it requires at least 10MB of free hard drive space) incorporates maps, sounds, and an electronic version of the Thompson Chain Reference Bible, which includes its own set of marginal notes and references, archaeological information, and encyclopedia-style entries about various Bible characters, doctrines, and customs.

Bible passages are shown in a bold, easily readable font, but only a single verse at a time. To read a passage of several verses, you have to click on the Autoread button, which advances the text verse-by-verse at a predetermined speed. The whole setup is slow and annoying.

Nevertheless, the program does have its niceties. Accompanying each displayed Bible verse are marginal notes directing you to the Thompson Chain Reference system. The Chain Reference button takes you to that entry in the Text Cyclopedia, telling you where to find more information.

The Measures selection instantly translates New and Old Testament measures, weights, and distances into U.S. or metric equivalents. And the Sounds function lets you select hard-to-pronounce Bible names from a list and hear them spoken aloud. (The list seems oddly incomplete. Tongue twisters like Zaphenathpaaneah and Tiglath-Pileser are inexplicably absent, while other, easier names—Elihu, for example—are included.)

Much of this is terrific, but beware: HyperBible 2.0 is riddled with HyperTalk programming errors. A typical foul-up is in the Archaeology feature. It's supposed to provide quick access to Thompson Text Cyclopedia entries dealing with any of the archaeological subjects listed in the menu. But through a programming goof-up, the program takes you to the wrong entry every time.

Beacon Technology now provides a patch disk that corrects a number of these programming errors and adds several improvements to the program. I received the patch disk a few days after calling Beacon's tech-support number and complaining about the obvious programming blunders. The patch disk did clean up all the problems, but it also *created* a few; the Search Builder and Bible text functions completely stopped working after I installed the patch disk files.

Verse Search

Verse Search, the oldest Bible-study program, is actually part of a family of software products called The Word processor. Verse Search itself is the basic concordance program you use to look up Scriptures and make word searches. There are ten other programs you can buy that integrate with Verse Search. Like macBible, the program is available in the four standard English translations.

(continues)

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ITC Benguiat $50
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Century Bold Ital
ITC Century Condensed $100
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ITC Cheltenham $150
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ITC Cheltenham Cond $100
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Cheltenham Book Cond
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Chrome Bumper (IC) $25
CHROME BUMPER
Citi (IC) $50
Citi Light
Citi Bold
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Claredon Book
ITC Clearface $150
Clearface Regular
Clearface Regular
Clearface Bold
Clearface Bold Italic
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Clearface Contour
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COMIC BOOK
COMIC BOOK TWO
Commercial Script (ATF) $25
Commercial Script
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Cooper Black
Cooper Black Ital
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COPPERPLATE
COPPERPLATE
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ITC Garamond $150
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ITC Garamond Condensed $150
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Goudy Italic
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ITC Leawood $100
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ITC New Baskerville $100
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Thunderbird $25
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Uniform 46 Light
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Uniform 56 Book
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Uniform 66 Bold
Uniform 75 Black
Uniform 76 Black
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Uniform 48 Condensed
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Verse Search provides better, faster access to Bible texts than HyperBible does, but it's still not as smooth as macBible. Searches are fairly easy to conduct, but the search options are more limited; "NOT" is missing in its menu of Boolean operators, so you can't narrow your searches. Its searches are considerably slower than macBible's, but the new version (which will probably be out by the time you read this) should help build even large indexes in just a few seconds.

By far, Verse Search's best feature is its integration of Hebrew and Greek transliterations. Each Bible word is numerically keyed to an entry in *Strong's Exhaustive Concordance,* a biblical reference work first published in 1898.

All of Verse Search's add-on modules are well integrated. The Chain Reference program provides a list of cross-references in the margin of the Bible text. With the Personal Commentary feature installed, you can create verse-by-verse commentaries on Bible passages. Verse Typist, a neat desk accessory, inserts any designated Scripture text into a word processor document; and the Chronological Bible module outlines the whole Bible in chronological order. The new version will include faster access to Scriptures plus a bookmark function to mark selected passages.

The only glitch I found in using Verse Search was while activating the Bible Dictionary, another module. Try to access the dictionary while the Strong's Reference Number screen is up, and your system crashes like the walls of Jericho.

The Last Judgment

Which of these three programs is the best? From a technical standpoint, macBible is the superior product; it's fast, flexible, easy to use, and allows for multiple-translation comparisons. Verse Search goes far beyond macBible in providing a platform for extensive Bible study. And if you want to be taken by the hand and led through your Bible study one step at a time, HyperBible may be the answer, though dealing with its sloppy programming will at times require the patience of Job. Of course, none of these programs can tell you everything about what the Book of books really means. But the hours you save in your studying will give you plenty of time to figure that out on your own.

—Joseph Schorr

See* Where to Buy *for contact information.

Network-Monitoring Program

NET WATCHMAN 1.1

Pros: Runs in background under MultiFinder; maintains log of network events; alerts can be audio and/or visual; alert displays can be turned off.
Cons: Excessive monitoring adds to network traffic; alerts are restricted to manager's workstation.
Company: AG Group. **Requires:** Mac Classic; AppleTalk network. **List price:** $195.

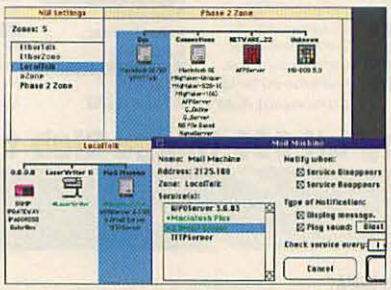


Does your phone ring off the hook every time something happens to the network? Net Watchman won't solve all your network problems, but you'll probably get fewer phone calls and do less legwork.

Net Watchman is the first program for monitoring a network and sending alerts about problems. It tells you when something goes wrong, such as a router or laser printer going down.

Alert, Alert

The most detailed alert in Net Watchman is a node alert. Once you select a particular node from Net Watchman's graphical map of devices (one map per zone), you can have the program notify you when any of the network services on that node appear or disappear. Thus you can receive notification if a certain Mac disappears from the network or only if that Mac loses its QuickMail connection. These alerts can be audio, visual, or both.



Who's on First? This screen shows two different zones (Phase 2 Zone, upper right window; LocalTalk zone, lower left window). The services are listed below the icon for each node. In this example, the Mac Plus in the LocalTalk zone, labeled Mail Machine, has been selected for a service alert. In the Phase 2 Zone, the Mac SE/30 has also been selected for an alert (as indicated by the blue highlight); the Netware 22 server has disappeared from the network, as indicated by the red icon.

Net Watchman does not monitor the network continuously. Rather, you set the time between service checks for each alert that you create. You can set a short time period of 5 or 15 seconds for crucial resources, such as a file server or E-mail server, and much longer time periods (perhaps 15 or 30 minutes) to see if a particular Mac is on the network.

Net Watchman includes global alerts. You can set it up to inform you any time a new service or a new node appears or disappears on the network, or if a zone appears or disappears. When you set up global alerts, you must specify the same time period between checks for nodes and services. A different time period can be specified for checking zone changes.

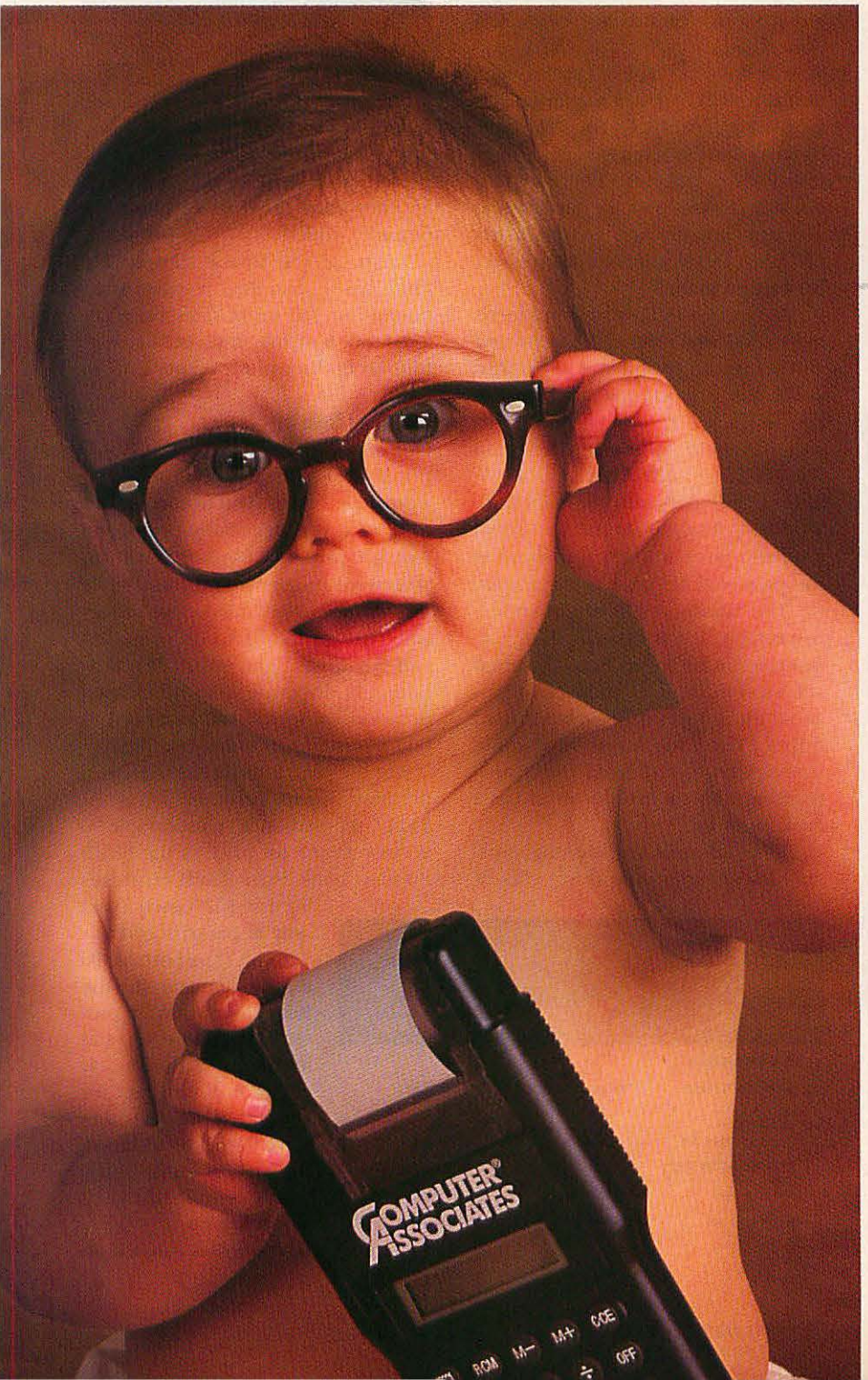
In addition to displaying alerts, Net Watchman logs all the monitored network activity (zone changes, nodes appearing and disappearing, and so forth) to special log files. Unfortunately, Net Watchman creates three different logs—the Event List for node appearances, the Network List for zones and services, and the Alert List for the alerts you've set. It would be easier to locate problems if all event lists and alert lists were in one log.

Net Watchman provides two modes for monitoring a network: attended and unattended. The attended mode is most useful when the administrator is on hand to respond to the alerts. The unattended mode doesn't display the alerts, but simply logs them to the proper file(s).

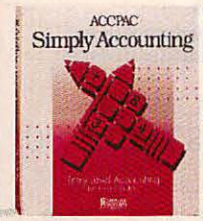
One missing feature is the ability of the network manager to receive alerts on any Mac. Rather than run Net Watchman in the background on my Mac all the time, I'd like to run it on a second Mac and have the program send me E-mail whenever something goes wrong (assuming the whole network hasn't crashed, of course).

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Just Managing

Net Watchman is a good first step at monitoring network events on an AppleTalk network. The program's ability to log network events also makes it easy to discover what went wrong when a network crashed, although the answers are often buried a lot deeper than the Net Watchman logs. Net Watchman is not a substitute for a packet analyzer or traffic monitor, but it is a good supplement and should be a part of every network manager's toolbox.—**Dave Kosiur**

See **Where to Buy** *for contact information.*

Removable-Cartridge Drive

BERNOULLI TRANSPORTABLE 90

Pros: Good performer; reliable.
Cons: Doesn't ship with a cartridge.
Company: Iomega Corporation.
Requires: Mac Plus; System 6.0.5.
List price: $1149.

One of the unwritten laws of computing says that a hard drive can never be too large; files always seem to multiply to fill the available space. One popular solution to this never-ending problem is the removable-cartridge drive. When you fill up a cartridge, you simply pop it out and put in a fresh one. The market has been dominated by the 44MB drives and the newer 88MB drives from SyQuest Corporation. Iomega's Bernoulli Transportable 90 is a new and worthy competitor.

What's the Difference?

SyQuest drives use cartridges containing rigid (and delicate) hard disk platters. Rigid drive platters are susceptible to head crashes, and contamination from dust and smoke particles. SyQuest drives use an air-filtering system to deal with contamination. Bernoulli cartridges consist of flexible disks that resemble large (5-inch) floppy disks, encased in a hard shell. Iomega claims that because the disk is flexible, Bernoulli cartridges are relatively immune to bumping and other physical shocks while in operation.

The Transportable 90 is the latest incarnation of drives using Bernoulli technology. The 90MB cartridges actually format to 84.5MB. Iomega also markets an older, 44MB version of the drive. The 90MB unit can read, but not write, removable disks recorded in the 44MB format.

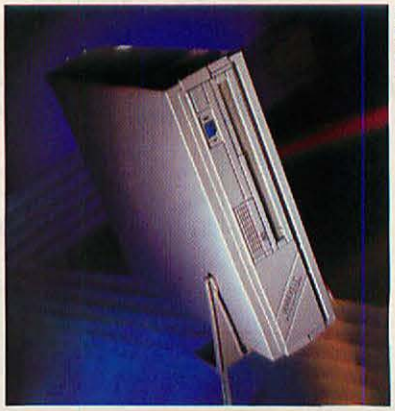
Performance and Use

Installing the Transportable 90 is simple. It has the usual dual 50-pin SCSI connectors on the rear panel, and you set the SCSI address with a push button. The drive has switchable SCSI termination, a feature I wish every SCSI device had. Dragging the INIT to the System Folder completes the installation (the INIT handles mounting and formatting cartridges). The 90MB cartridges take about ten minutes to format. Iomega includes a utility application called Workshop, for reformatting and testing cartridges, and a version of Dantz Development's Retrospect backup program.

Iomega's 44MB drives tend to be quite loud while the disk is spinning and while accessing the disk. The 90MB unit is much quieter. Bernoulli cartridges are more susceptible to wear than rigid media are; to lengthen the media life, the drive spins down after a user-definable time period. Workshop lets you set the spin-down time and gives you a graph showing the projected life span of the media.

The Transportable 90 turned in a respectable, if not blazingly fast, performance in my speed tests. Measured access time was 27 milliseconds—about the same as many low-end hard drives. I never felt slowed by the unit in everyday use. I used the Transportable 90 as an extra drive and as a backup device.

In an informal test, shaking, moving, and bumping the drive while it was reading and writing lent credence to Iomega's claims of shock resistance. The drive successfully completed and verified a backup of another hard drive while being repeatedly jostled.



LUIS DELGADO

Bernoulli Transportable 90

Although the drive is transportable (and has a handle), it weighs 12 pounds, so you might think twice before taking it on long trips. But for short trips around town, it's convenient.

The Final Spin

One annoying thing about the Transportable 90 is that it doesn't ship with a cartridge. Instead you're encouraged to send in your registration card, and Iomega returns a cartridge containing shareware programs and files. While a cartridge is a good incentive to register, it's frustrating to be unable to use the drive right out of the box. Bernoulli drives need to be cleaned occasionally, so you will also need to buy a separate cleaning cartridge.

In the past, Iomega has charged a premium for its Bernoulli drives. At $1149, the Bernoulli Transportable 90 is close to the list price of the 88MB SyQuest units. Extra 90MB cartridges list for $229 each (sold only in packs of three).

The Transportable 90 is a fine unit and with the Retrospect software provides a good backup and archiving solution. If you're in the market for a removable-cartridge drive in the 90MB range, the Transportable is well worth considering.

—**Tom Negrino**

See **Where to Buy** *for contact information.*

PERFORMANCE FIGURES

Test	Iomega Transportable 90	APS Quantum 105 hard disk
REAL-WORLD TESTS		
Copy 10MB folder (104 files)	56 seconds	1min. 9 sec.
Duplicate 3MB file	11 seconds	15 seconds
SCSI EVALUATOR TESTS		
Average read	.834MB/sec.	.888MB/sec.
Average write	.846MB/sec.	.895MB/sec.

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Circle 16 on reader service card

CD ROM

ABOUT COWS 3.09

Pros: A wealth of information about America's favorite farm animal.
Cons: Poorly organized; no useful graphics.
Company: Wayzata Technology.
Requires: Mac Plus; CD ROM drive.
List price: $39.

About Cows. I'll admit that the prosaic title of this CD ROM did not kindle in me a burning desire to purchase it—but the publisher's press release certainly did, heralding not only "history, myths, literary references and trivia on America's favorite farm animal," but also "color images of various bovine poses." Needless to say, I ordered one immediately.

I must confess, it was the "various bovine poses" that intrigued me the most; after all, just how varied could bovine poses be? After years of observing these gentle ruminants, I have noted but a few poses, namely (1) standing around, (2) grazing, and (3) lying down. Sadly, most of the 32 digitized photos on the CD fell into these mundane categories, with the notable exception of a cow in sunglasses standing on a pier (still in the "standing around" category, I know—but the shades were a nice touch). Adding to my disappointment, three of the graphics showed nary a cow, but featured only barns. Worst of all, the unlabeled pictures were merely decorative; nowhere on the CD was there a bovine anatomy chart or pictures that would enable me to tell a Holstein from a Guernsey. For the final blow, About Cows crashed every now and again as I viewed the pictures.

What About 'Em?

Swallowing my disappointment at the pictorial portion of the disk, I moved on to the text portion. My spirits lifted a bit when I began to peruse the disk's 400,000K or so of information. About Cows is an electronic rendition of the book of the same name, authored by Sara Rath. Rath, like a grazing cow, covers a large portion of the field but leaves certain areas virtually untouched. The text ranges from the scientific (for example, more detail than most people would want to know about artificial insemination) to the practical (such as criteria for judging cows) to the artistic (cows in music, literature, and the fine arts). The tone is generally amiable and accessible, even when discussing scientific matters; I especially enjoyed one paragraph that began, "Another fun thing about embryo transplantation and cloning . . . "

Bovinity's contributions to history, religion, advertising, and a number of other areas are discussed. The Famous Cows section includes notorious bovines such as Mrs. O'Leary's pyromaniacal companion, as well as lesser lights such as Elm Farm Ollie, the world's first flying cow. Well-known advertising cows are acknowledged, including Borden's Elsie and Elmer (I was pleased to see their seldom-mentioned offspring, Beulah and Beauregard, noted also). The text occasionally strays into the bizarre, with accounts of UFO-induced cattle mutilations and a cow-moose romance, but it is generally an interesting smattering of bovine facts and lore.

As an aficionado of cowboy poetry and song, I was dismayed at the paucity of the Cowboy Songs section (although About Cows doesn't claim to be the definitive source for the cowboy arts). I was surprised to see that some fairly obscure musical references were included on the CD, while several cow-related classics were left out. For example, while most people know that Kokomo Arnold's immortal "Milk Cow Blues" was sung by Elvis Presley, who *cares* if it was also performed by the Chocolate Watchband? I suppose somebody might—but not me. I'd rather see precious disk space devoted to songs like Rex Owens's "Cattle Call" or Stan Jones's unforgettable "Ghost Riders in the Sky."

Finding a Reference in a Haystack

About Cows offers two ways to access its information. You can (appropriately enough) browse the CD's text or pictures, clicking on arrows to move from one "card" to another, or you can search for a particular word or phrase. Although About Cows superficially emulates HyperCard's user interface in that its sections are called cards and you click on arrows to move forward or backward a card, the analogy stops there. Unfortunately, the About Cows user interface is a flop. For starters, there's no table of contents; you're forced to click through dozens of cards to see what's on the disk. The so-called cards are actually text blocks of varying length; one card often covers several subject areas.



Name That Cow Although About Cows includes 32 color illustrations, they're merely decorative. The CD fails to augment its text with informative illustrations.

You can look for specific words or combinations of words with a Search button. Say you're looking for information on Holsteins. You type **Holstein** and click on Search, and the program presents you with a list of cards that contain the word *Holstein*. Double-click on a card in the list, and that card appears with each instance of the word in boldface text. Unfortunately, there's no way to jump from one highlighted word to the next; you must scroll through the card and spot each occurrence.

Another example of carelessness: the CD ROM version was apparently copied verbatim from the book, including captions for now-nonexistent illustrations. One can only guess what this one must have looked like: "Using the hinged head and the trapdoor in its side, two hunters could fire simultaneously from this unique decoy."

The Lowdown

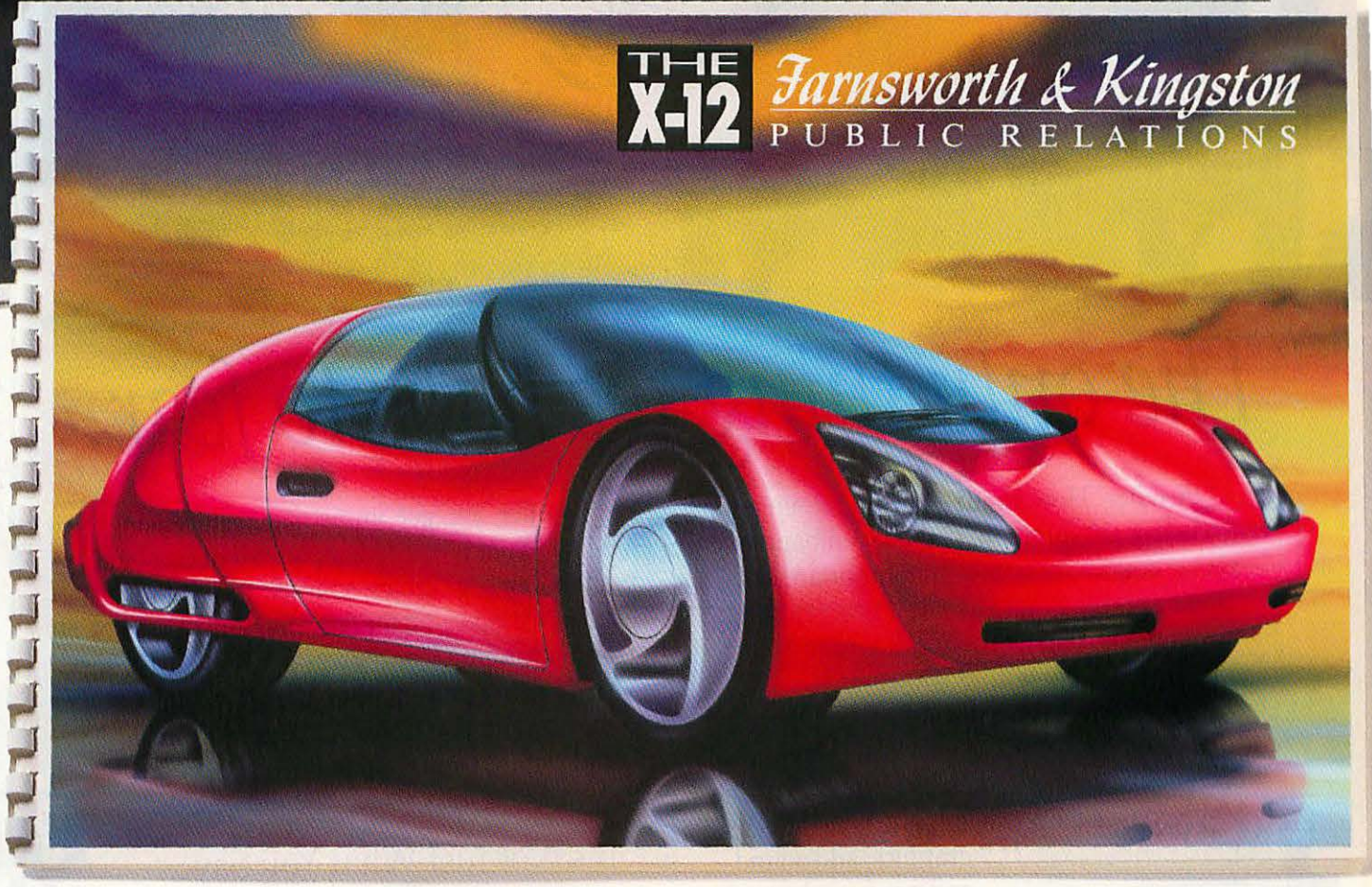
After ruminating a bit, I decided I liked About Cows in spite of its shortcomings. Even though I was disgruntled by the program's awful interface, I couldn't help but enjoy reading the text. Despite the CD's flaws, I now know a heck of a lot more about cows than I did before I purchased it. Did you know that your basic dairy cow averages about 41,630 jaw movements

(continues)

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THE X-12 INTRODUCTION





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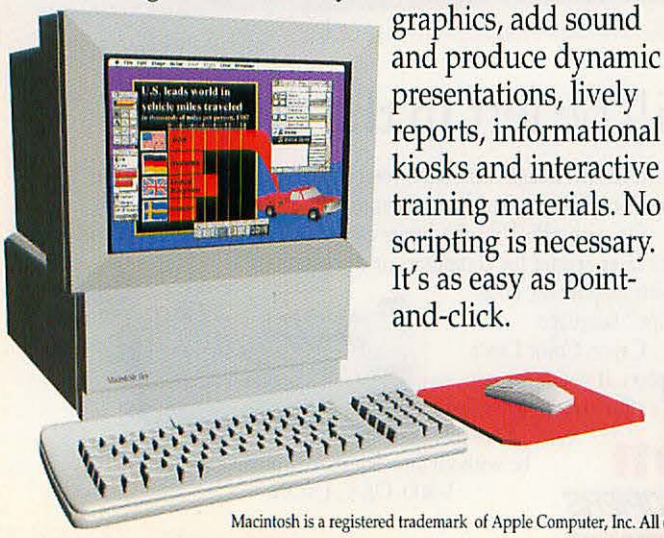
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a day? Were you aware that the typical American family of four eats about one cow a year? I'll bet you don't know where the world's largest Holstein sculpture is located, what a "freemartin" is, or where (or why, for that matter) you can buy a cow bra. If you want to impress your companions with your knowledge of cows—or if you're looking for a good novelty gift for a CD-endowed friend—try About Cows.

—Erfert "Don't Call Me Hereford" Fenton

See **Where to Buy** *for contact information.*

Outlining and Diagraming Software

INSPIRATION 3.0

Pros: Parent-child strategy for complex diagrams; automated branching and alignment tools; fit-to-window feature makes diagrams easy to preview and print. **Cons:** Text mode slow; Notes window needs a ruler. **Company:** Ceres Software. **Requires:** Mac Plus. **List price:** $295.

Based on the concepts that Tony Buzan details in his book *Use Both Sides of Your Brain* (E.P. Dutton, 1983), Inspiration helps you brainstorm using the Mac. Inspiration is useful for creative writing and creating flowcharts, storyboards, and presentations. Version 3.0 lets you add "children" to a parent diagram, import graphics into diagrams and outlines, edit symbols, customize symbol menus, and add color. It also includes a spelling checker with both fixed and customizable dictionaries.

Diagraming and Outlining

Inspiration 3.0 diagrams start with an oval symbol—for your main idea—at the center of a large, adjustable snap-to grid. You can add more symbols, linked or unlinked, to your main idea. You click and drag symbols to position them with the grid on or off, or use the Arrange function to create branching trees in any direction. A Notes window lets you attach up to 15K of text per symbol, but entering long notes is slow on an SE or lower.

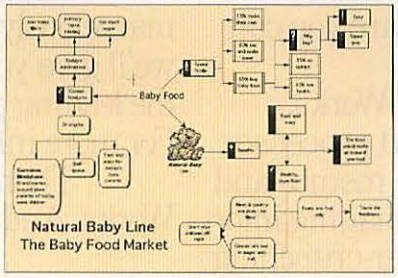
Inspiration's many controls help you arrange diagrams, set the zoom level, and hide or focus part of a tree. As in any highly graphical program, the faster the Mac, the faster the screen redraw. On slower Macs, you wait while it redraws your diagram.

One substantial addition to version 3.0 is the ability to add children to a main diagram. Children are worksheets for diagrams or outlines; they are attached to the parent diagram or outline and have all the capabilities of the parent. You can separate a child from the parent by using the Disown function (unfortunate term), which saves the child as a separate document. I think Disown should have the same options as Save As, which lets you save any diagram as PICT and save text in outline or text mode as unformatted text, More 1.X, or Microsoft Word 3 and 4 RTF.

Both links and symbols can be manipulated. Links can be bent or reversed, have different-size arrows or text labels, and there can be multiple links to or from any symbol. In addition to the symbols for flowcharts, business presentations, and the like (provided with Inspiration), you can create your own symbols with Inspiration's Strip Symbol Editor (for text and Fat Bits editing) or use the graphics-import capability. You can add symbols to two customizable user menus—up to 50 symbols per menu.

Presentation and Printing

You can move from the diagram mode to the outline or text mode at any time, but annoyingly, you can't move between the outline and text mode without going through the diagram mode. Inspiration's outliner is good, reminiscent of Acta's and More's. Inserting topics and subtopics is a breeze, and you can Hide, Show, Move, Promote, and Demote topics using menu or ⌘-*key* functions or by clicking and dragging topics up, down, left, or right. You can also add and scale graphics right in the outline. Changes made in the outline are reflected in the diagram.



Symbols Inspiration gives you a variety of stock symbol options. You can create your own symbols or import graphics, which in turn can be used as symbols.

You can apply global style changes to text at any level of the structure. Embellishing a diagram is easy (you select alternate symbols from menus); you can size symbols automatically, align them by using various alignment tools, and give symbols shadows or spot color; and you can align text to the left or right, or center it. In outline mode, you can add topic, date, and page information to headers and footers, incrementally set margins, and choose line spacing (though you only get four fixed leadings).

Inspiration's Print Preview enables you to scroll in Full Page or Landscape mode, and you can use the magnifying glass for closer scrutiny. You can't, however, scroll backward to see previous pages. Diagrams and outlines can be printed showing partial views of information. In text mode you can change styles in the entire document, but you cannot change just selected levels in a hierarchy. Printing works flawlessly in diagram and outline modes, and the Print To Fit One Page option is a real improvement over the same feature in version 2.0.

A Window on Inspiration

Inspiration 3.0 has superior diagram controls and flexibility, and the manual and idea book are well organized. I have some quibbles. Its text processor is too slow, the Notes window lacks a ruler for paragraph formatting, and you can't set a default size or position for the pop-up Notes window. The inability to move directly from diagram to outline or text mode is annoying. A window expanded for a large screen stays expanded in outline or text mode; and because text wraps to the window size, this makes for some pretty wide paragraphs.

But these criticisms are personal prejudices. Stick to the things that Inspiration does best (diagraming and outlining), and keep your notes short, and you'll find it an inspiring addition to your creative process.**—Michael Miley**

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Music-Notation-and-Publishing System

MUSIC PUBLISHER 2.5.2

Pros: Unique input device speeds data entry; simple yet full-featured software; overall performance is quite fast. **Cons:** No import or export of standard-format MIDI files; not compatible with Apple's MIDI Manager. **Company:** Repertoire. **Requires:** Mac Plus; second disk drive. Recommended: PostScript printer. **List price:** $495.

One of the biggest problems with music-notation-and-publishing programs is data entry. Most programs let you select pitches by positioning the cursor over an on-screen staff and clicking on the correct line or space. Many programs accept files from sequencing programs so you can generate printed scores from previously recorded pieces; and some offer real-time input from a MIDI keyboard, which lets you play music as though recording on tape. But importing sequencer files or relying on real-time input requires extra equipment and some keyboard skill, and mouse-based entry can be slow and clumsy. The latest version of Music Publisher, a unique hardware-software notation system, is flexible, fast, and ideal where speed and efficiency are the primary concerns.

Presto—Music Appears

Music Publisher includes the Presto input device, which looks something like an add-on numeric keypad. It has four rows of seven keys for notating pitches and a row of function keys, giving you access to symbols for repeats, pedal, bowing, and tremolo. That means you can enter a lot of data in one pass; other programs make you switch out of note-entry mode to insert non-note symbols. Where some programs display unbeamed, evenly spaced notes on screen in note-entry mode, and clean up the screen only when you switch to another mode, Music Publisher beams and spaces notes correctly as you enter them.

Scoring is a two-handed affair, with one hand typing on the Mac keyboard to specify rhythmic values, and the other typing pitches on the Presto keyboard. This doesn't mean that each note requires two keystrokes; to enter a series of, say, eighth notes, you simply type the Mac key for eighth notes once, and enter pitches on the Presto keyboard until you need to change the rhythmic value.

A function key on the Presto lets you enter chords, halting the cursor so that the notes stack up to form a chord. Another function key lets you enter notes with small heads and grace notes, so you don't have to go back and enter them later. Holding down shift and a Mac key produces a rest of the corresponding rhythmic value; option plus a Mac key gives you a note with an X-shape head.

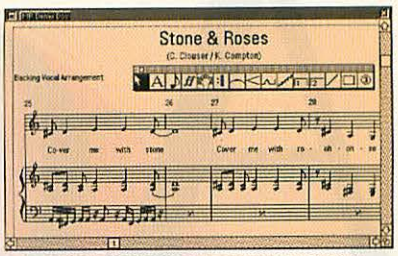
Before entering any notes, you choose one of six standard systems or design your own; you configure each staff with time and key signatures; and you place bar lines where you think you'll need them. The program automatically adds systems and pages as needed. You can create custom beat groupings that automatically beam notes in uneven time signatures, and you can beam and tie notes manually either during or after note entry.

The MIDI Zone

Music Publisher's MIDI features are simple but surprisingly sensible. You can record in real time from a MIDI instrument, playing along to a metronome much as you would when playing into a sequencer. You select the rhythmic value to quantize to and a rounding percentage, which compensates for performance articulation. If you get all your settings right, what appears on screen will sound more like what you intended and less like what you actually played.

In step-time entry mode, you can set pitches via MIDI input, rather than using the Presto, while using the Mac keyboard to select rhythmic values. You can insert gradual or instant tempo changes and create program-change commands that change your synthesizer to a different sound at any point in the piece.

Finally, you can play a score from the cursor position to the end, or play a selection only, assigning each voice to one of the 16 MIDI channels available on the Mac's modem port. (Music Publisher is not compatible with the Apple MIDI Manager, however.) Music Publisher interprets crescendos and decrescendos, text-based dynamic markings, and accents, creating the corresponding dynamic effects by altering the outgoing MIDI data; and the program understands repeats and alternate endings.



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Under Construction A page of music under construction in Music Publisher. Each syllable of the lyric is linked to the note above it and remains properly positioned throughout editing.

Lay It All Out for Me

Music Publisher has simple and effective tools for laying out systems, although the operation of these tools is not always intuitive. When entering lyrics, you can link text to a voice so that each syllable remains linked to its note even when you edit the note (see "Under Construction"). Another useful function lets you name sections of a piece—for example, verses and choruses—which can then be selected for editing.

The program uses its own font, Repertoire, which includes bowing marks, mordents, and fingering marks. There are no guitar chord symbols, though you could create them using the program's drawing tools.

Here and there Music Publisher departs from Macintosh conventions. For instance, to move or reshape a symbol you must use the tool that created the symbol, instead of the selection arrow as in most graphics programs. Also, there is no way to import from or export to standard format MIDI files, features that many users will sorely miss. But these are minor grumbles. If you can live with MIDI functions that are a little limited and lack file-import/export capabilities, Music Publisher is one of the fastest and cleanest programs out there.

—Charles Clouser

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Liz & Dave & Chuck & Randy

PERSONAL TRAINERS ARRIVE ABOARD AUDIOTAPES, VIDEOS, AND BINDERS

BY DAVID POGUE

Why are Mac software manuals so lame? Then again, whatever happened to software so intuitive you didn't need a manual at all? No matter; if you want to learn a program and you're not happy with the documentation—or you're not the manual-reading type—meet your prerecorded, mellow-voiced pals: Liz, Dave, and their friends.

They're the hosts of training tapes, audiotapes, and videotapes. They're available for as little as $50 for two hours of friendly, if bland, hand-holding and instruction.

The trouble with an audiocassette is that you're condemned to work at a fixed pace. Most videos don't expect you to learn by following along at your computer—you're just supposed to soak in what you're shown on the TV. Of course, that's a problem in itself: you don't retain nearly as much watching a program demo'd as you would if you worked it yourself.

You can also get training programs in the form of—get psyched—more manuals. We're talking big, heavy, third-party supermanuals in three-ring binders. But with a book, you can skip what bores you, without worrying that Liz or Chuck is saying something critical while you're fast-forwarding.

Personal Training Systems

First the good news about these pricey, heavily advertised audiocassettes ($79.95 each): the design, organization, and writing are top-notch. The voice in your headphones doesn't just tell you what to click on and where to drag; it explains *why,* which is critical.

The bad news is Liz, your personal-training voice. She speaks slowly, patronizingly, as though you're a not-very-bright child. Worse, she seems to have no idea what her script's words mean; her inflections are so out of control that some sentences lose their meaning. "Type *in* the value by *press*ing Com*mand* quote," she burbles. No, Liz. You mean "Command *quote.*"

There are a few inaccuracies here and there (Liz keeps calling radio buttons "circles"), but otherwise the content is fine. In fact, after enduring Liz's insulting singsong, mastering your software will seem like a snap. (Four- to eight-tape series are available for System 7, PageMaker 4.0, FileMaker Pro, and eight other programs; buy six tapes and get 20 percent off.)

MacAcademy

If Liz is phony and plastic, meet the other extreme: Randy, Keith, and their friends from the MacAcademy videos. Each unscripted two-hour video consists of a single, seemingly unedited camera shot. The hosts ad-lib their way through each program, sometimes stumbling, sometimes contradicting themselves, but at least displaying personality. "Uh, you should either go back and review the other tapes, or you can, ah, go out and have a look in your manual or see however to, to, ah, learn those features," says Randy, his energy starting to flag after hours of PageMaker-teaching.



And there are errors; Keith says the FileMaker Temp folder contains "templates"; Randy keeps referring to PageMaker documents as "programs." But neither the goofs, nor the unrehearsed quality, nor the obvious shoestring budget keep these tapes from being enlightening. In fact, the biggest problem is that the hosts don't work through any one project from start to finish (and don't make *you* work through one). Instead, they explore one feature after another, out of any real-world context—they're tours, not lessons.

A tour can be useful—it can help you decide whether or not to spend hundreds on a program. And on the training-tape scale, these are cheap: $49 each. They all look a little homemade, but there's a 30-day guarantee, so who can complain? (At this writing, there are 57 titles, covering 21 programs, plus tapes on networking, utilities, System 7, and so on.)

Baobab

The narrator of these audiotapes ($79 each) is unintroduced, but she's nice to listen to. At first, you can be con-

(continues)

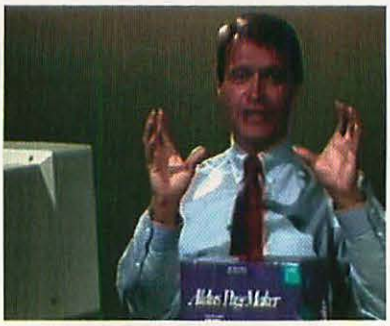
fused by the way you're directed to use menus. In the FileMaker tape, for instance, you hear the Nameless Woman say "choose-select-find." A funny way to say choose the Find command from the Select menu. And you're not given much credit for intelligence: "Type John," she says slowly, "J . . . O . . . H . . . N." Worst of all, you're sometimes directed to take an action without being told why.

The great thing is, though, that these tapes make an attempt to lick the pace-of-instruction problem. Musical chimes mark spots where you're supposed to pause the tape recorder to carry out a task. In addition, a workbook contains optional exercises at the end of each taped segment. The overall effect of these tapes is a self-paced, exploratory, and successful training process. (FileMaker Pro, MacDraw II, MacWrite II, and MacProject II tapes are available.)

The Pollard Group

The Mac MBA Video Training Courses have the right idea. They direct you to place the TV and VCR next to your Mac. It's a hassle, but the point is that these unusual videos combine the interactivity of audiotapes ("Now try this . . .") with the clarity and charisma of video.

The massively expensive videos ($475 for two one-hour tapes) are extremely well done. An unpretentious, genuinely Mac-savvy host follows a carefully designed script without sounding artificial. Except for occasional scan lines rolling up the Mac screen, the tapes have terrific production values: cool music, smooth transitions, and eight-second blue title screens between lessons (which make fast-forwarding to a particular segment easy). MacAcademy's videos include only full-screen shots of the Mac monitor, making icon names and other small elements tough to see; but the MBA series uses close-ups, selective video highlighting, and subtitles (when a key term is introduced, for example) to splendid effect. You can even hear the mouse and keys being clicked; for some reason, that makes it easier to relate to the computer on your TV screen. These tapes would be the only way to go, if they just cost 90 percent less. (PageMaker, Word, Excel, and System 7 videos are available.)



Professor Mac Randy, a MacAcademy video-teacher, expounds on the virtues of PageMaker.

TDG

A neatly mustachioed guy named Craig is the host of TDG's excellent $49 MacWrite II video. He's scripted, but speaks helpfully and comfortably. The brisk pace, combined with the thoughtful organization, adds up to a solidly packed 90 minutes. What's more, the production values are high, with video highlighting, quick cuts to the keyboard (when keyboard shortcuts are used), and breaks to outdoor locales as new segments are introduced.

There's a clock ticking away in the corner of the screen, and the back of the box indicates which topic appears at which time; that makes it easy to find a particular segment. Because so much information is packed into this tape, and because segments are so crisply and attractively produced, the tape will be a fruitful reference long after your first viewing. (Two other tapes are available: a two-hour Word course and 45 minutes of Mac Basics.)

Individual Software

This disk-based tutorial system, a lot like HyperCard, runs side by side with PageMaker (under MultiFinder or System 7). Needless to say, you need enough memory and screen real estate to accommodate both.

But the system is surprisingly effective. The learning is utterly self-paced (you can safely exit the lesson at any time). And the authors have made good use of the medium. For example, there are little "Click here for more information!" icons that, hypertext-like, present one-screen detours into topics that interest you. The writing is clear and accurate and the illustrations plentiful and clean. It's amazing how much good, well-designed teaching is packed onto a $69.95 pair of disks. (Similar sets are available for Word and the Mac, and Individual Software also sells typing training programs.)

Aldus

Say what? Aldus? Yup . . . it's selling training manuals for PageMaker ($249) and FreeHand ($195). These impressive bindered courses, called the Discover series, are purely tutorial, and more in-depth than the program manuals; you learn everything by doing. You also get disks (containing tutorial files) and sheaves of sample printouts. The writing and organization of the 375-page texts are stellar; a rationale is given for every step.

Actually, these courses are designed as instructors' guides; there are notes like "Tell participants to release the mouse button" in the margin. But here's the secret of the month: these training programs work just as well outside the classroom. Anyone who doesn't mind learning by reading will probably find these step-by-step courses unbeatable.

Tutorland

These tapeless courses also come in a binder ($99.95 for a two-book course, or $59.95 for any one book). Contrasted with the dense, single-spaced Aldus equivalent, the writing and layout of the Tutorland books seem lightweight; it takes a full page, for example, to describe choosing PageMaker's Help command. (Other pages, in fact, are inexplicably blank except for a cartoon man holding a sign that says BLANK PAGE. Go figure.)

And the information isn't always accurate; you're told to use spaces (instead of tabs) to position headings in a table, for instance. There are funny names for things: the tab key is referred to as Tabulation, the option key is labeled Alt. Frankly, there are better ways to learn software—like reading the manuals. (Courses are available for PageMaker 4, Word 4, Excel 2.2, 4th Dimension, and HyperCard 1.0.) ■

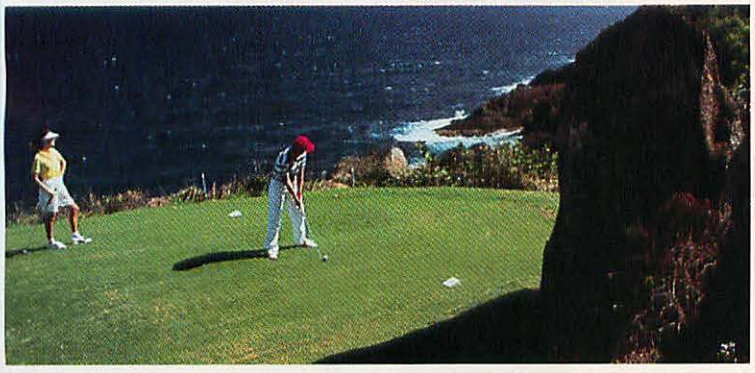
Macintosh teacher David Pogue's favorite activity is helping fellow New Yorkers take their first step into the Macintosh world.

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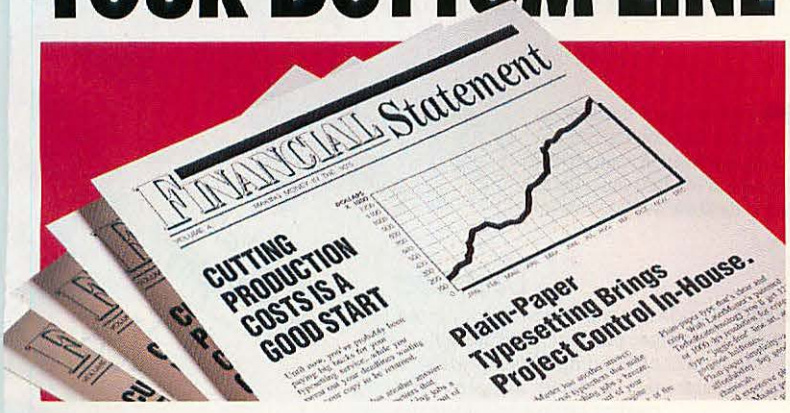
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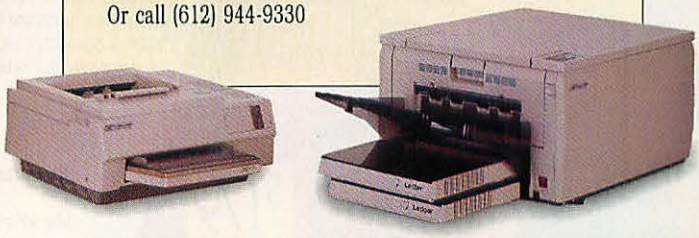
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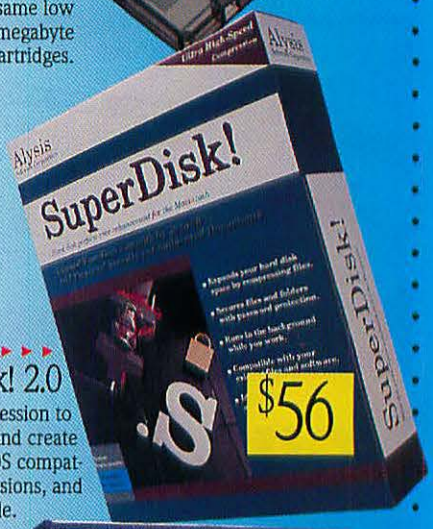
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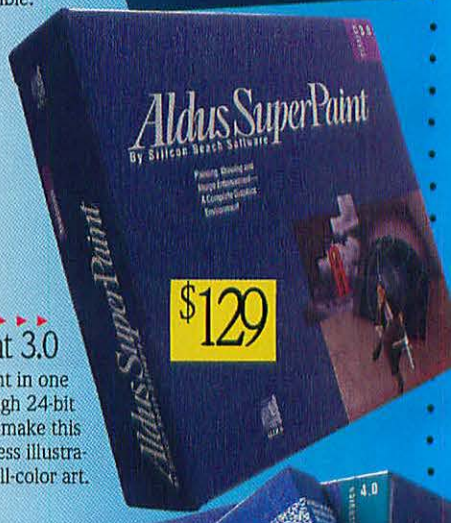
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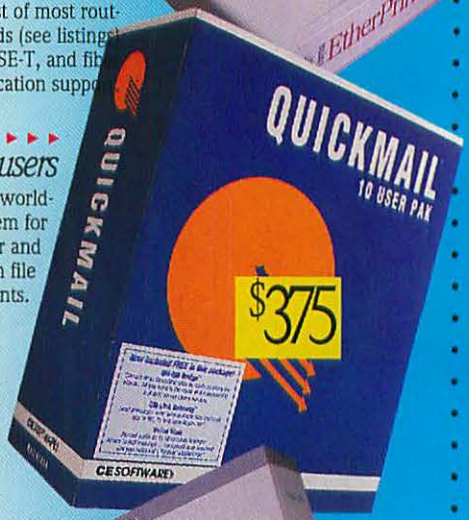
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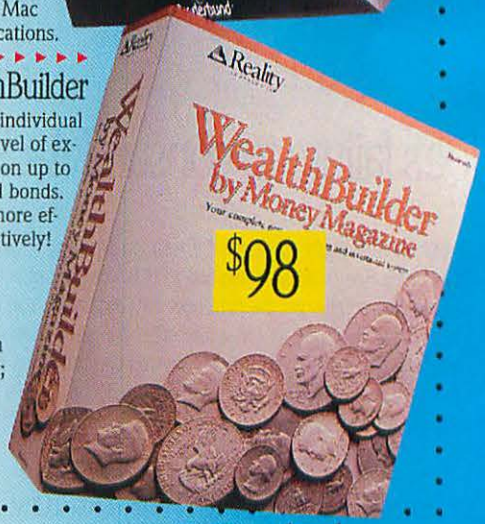
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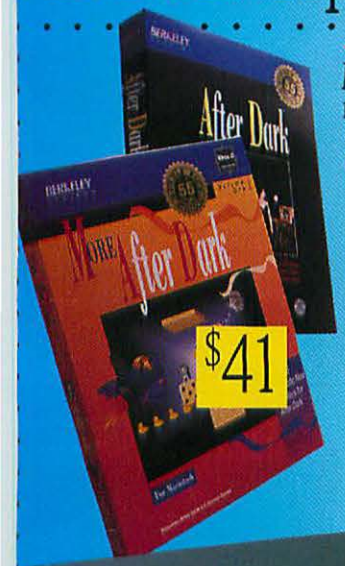
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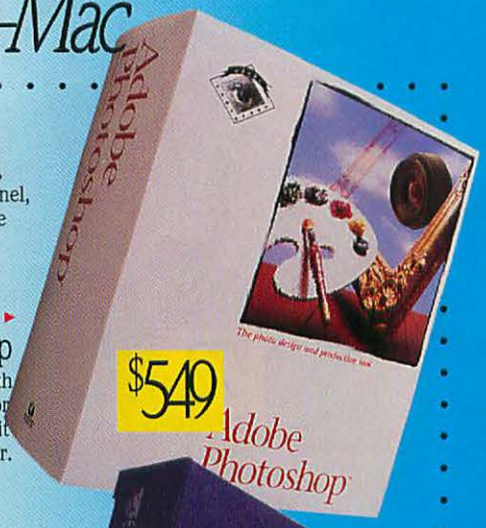
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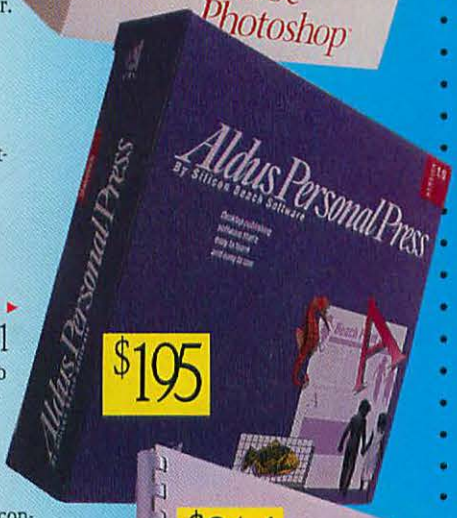
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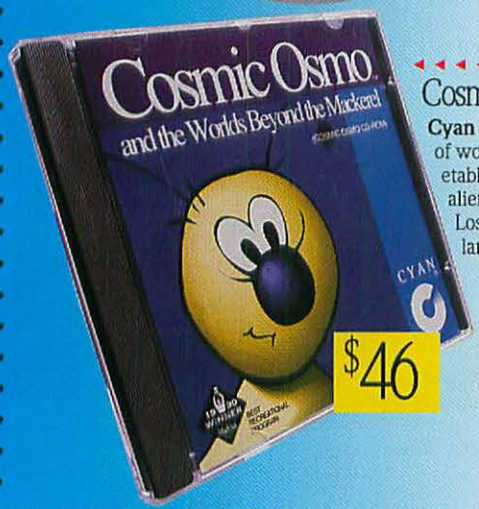
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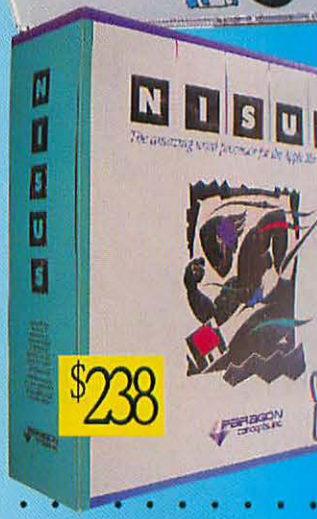
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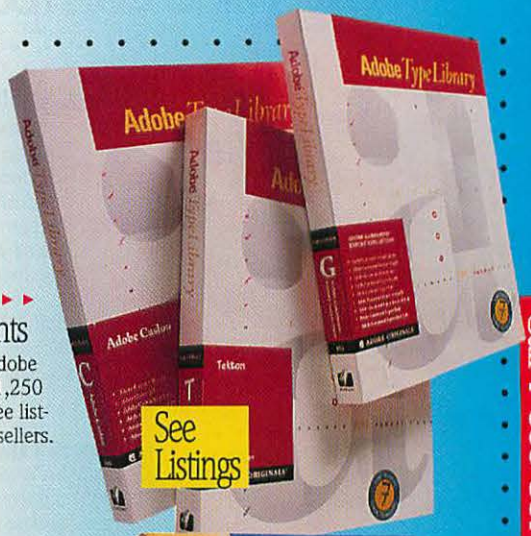
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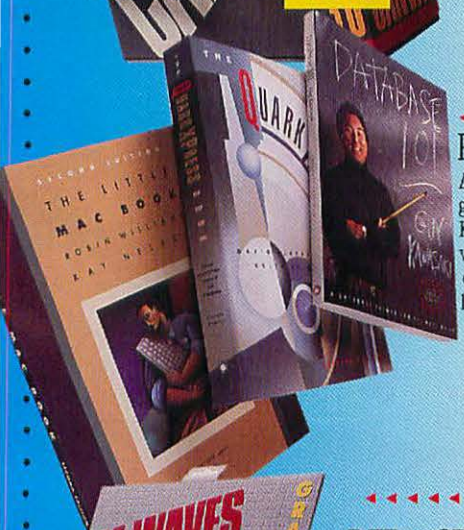
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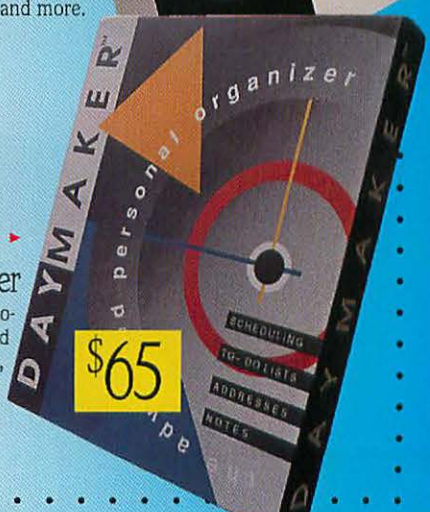
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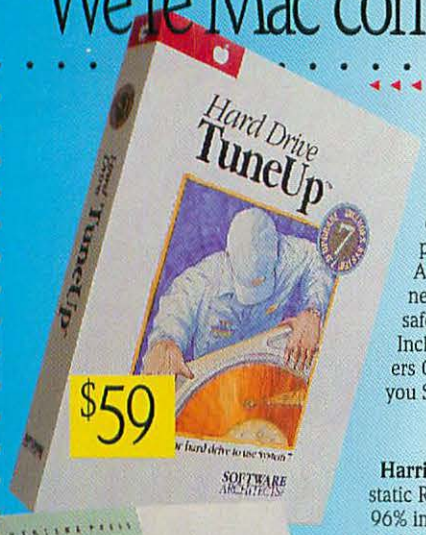
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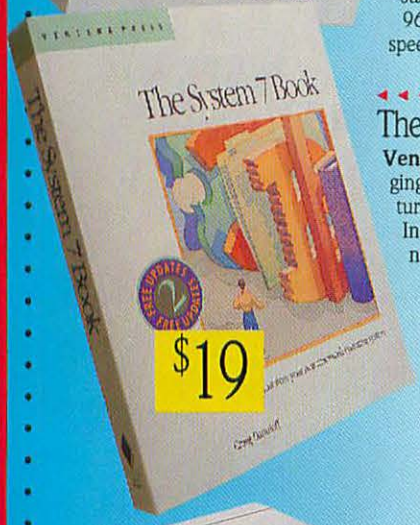
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- DP 44 Mb w/cartridge ... Call.
- DP 88 Mb w/cartridge ... Call.

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DaynaFILE II
- 1.2MB/1.44MB Dual Drive ... 688.

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- 68882 16MHz Coproc ... 168.

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- 25MHz ... 1158.
- 33MHz ... 1428.
- 40MHz ... 1538.
- 50MHz ... 1688.

Gemini SE 030
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- 25MHz ... 998.
- 33MHz ... 1298.
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NEW PRODUCTS

Edited by Carolyn Bickford

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

14MVX

14-inch color monitor that company says complies with Swedish government standards for low magnetic-field emissions. Compatible with Mac II machines; includes tilt-and-swivel base and antiglare treatment. $895. Nissei Sangyo America, 617/893-5700, 800/441-4832.



14MVX

Access CD/Performer

CD ROM player features 500ms access time, full stereo audio capabilities, CD ROM caddy, selectable SCSI ID, and dual 50-pin SCSI connectors. Ships with driver software, audio desk accessory, SCSI cable, and sample CD ROM disc. $599. Optical Access International, 617/937-3910, 800/433-5133.

AVR 8000 Series Scanners

Flatbed scanner scans images up to 8½ by 14 inches at 800 dots per inch. Can be upgraded from gray-scale to color. System 7–compatible. 8000/GSX $1690; 8000/CLX $2190. AVR, 408/434-1115.

C21LV-65MAX

21-inch color monitor. Operates from 15kHz through 65kHz in either interlaced mode or noninterlaced mode. Scanned images (such as those from video) can be enhanced to a higher pixel count for image analysis. $4695. Image Systems, 612/935-1171.



C21LV-65MAX

CDC-431

CD ROM player includes full-featured CD audio control unit and digital display built into CD ROM chassis, and one-touch autoeject button. $895. Chinon America, 213/533-0274.

Classic Performer

Accelerator for Mac Classic features 16MHz performance with a 68000 processor and 64K static RAM cache circuit. Company says tests show 96 percent improvement in processor speed, 15 percent improvement in SCSI speed, and 75 percent increase in math calculation speed. $299.95. Harris Laboratories, 612/941-2978, 800/783-3726.

CM2087M

20-inch color monitor features fast refresh rates for sharper images, tilt-and-swivel base, and antiglare treatment. Compatible with most major video boards for the Mac II family. $3595. Nissei Sangyo America, 617/893-5700, 800/441-4832.

DriveSaver

Electronic adapter allows older Apple 5¼-inch disk drives to be used with the Apple IIe emulation board in LCs. DriveSaver-20 converts the new 19-pin connector to the older 20-pin ribbon cable connector; DriveSaver-19 is designed for older Apple IIc and IIe drives with the 19-pin connector. $39.95. Micro World, 607/757-0500.

Ether Write

Adapter connects up to six LocalTalk printers to an Ethernet network. Available in either coax version or 10BaseT twisted-pair version. $695. Compatible Systems Corporation, 303/444-9532, 800/356-0283.

LaserPrinter 4 StarScript

PostScript-compatible laser printer that prints 4 pages per minute and comes equipped with 2MB of RAM, 35 outline fonts, 14 bitmapped fonts, and 16-character LCD display. $1995. Star Micronics, 212/986-6770, 800/447-4700.



LaserPrinter 4 StarScript

LC 10T/Thin Ethernet Card

Supports 10BaseT and thin Ethernet connections through Mac LC PDS port; has direct memory access for higher performance. Diagnostic software included. System 7–compatible. $359; with FPU $449. Technology Works, 512/794-8533, 800/794-8533.

LC Power

Power supply for the LC with an output voltage of 38.25 watts, approximately 28 percent greater than that put out by Apple's stock power supply. Dimensions match that of stock power supply. No tools required for installation. $159. Applied Engineering, 214/241-6060.

(continues)



LC Power

MacJukebox

Infrared interface box (includes cabling) and software enable user to control all infrared remote control devices, such as CD players and VCRs, directly from the Macintosh screen. Available with or without 40MB Macintosh Classic. $479; with Mac Classic $1979. Dancraft Enterprises, 213/643-8782.



MacJukebox

MacVGA

Video cable adapter enables most VGA screens to work with the Macintosh LC. $25. James Engineering, 510/525-7350. $12 as kit available from BMUG, 510/849-9114.



MacVGA

Mirror 600 Color Scanner

24-bit, 8½-by-11-inch flatbed color scanner scans at 600 dpi, contains 128K buffer to increase scanning speed, and includes Adobe Photoshop. $1397. Mirror Technologies, 612/633-4450, 800/654-5294.

Multiport Gateway

Multichannel router supports AppleTalk, TCP/IP, and DECnet simultaneously. While acting as a DECnet Level 1 router, the Multiport Gateway also routes to IP networks, EtherTalk networks, and other LocalTalk networks. $4995. Webster Corporation, 408/954-8054, 800/457-0903.

PageView LC

15-inch portrait display for the Macintosh LC supports 72-dpi, 80-dpi, and 88-dpi resolutions. Features flat screen, sharp focus control, and tilt-and-swivel base. $990. Sigma Designs, 510/770-0100, 800/845-8086.



PageView LC

Panther Tape Backup

Quarter-inch tape drive for Mac Plus, SE, SE/30, II, IIcx, IIci, and Portable. Performs incremental, file-by-file, and image backups; compatible with A/UX operating systems. Provides unattended-backup capability, data compression, and volume backups. 150MB system $2145; 525MB system $2695. Tandberg Data, 805/495-8384.



Panther Tape Backup

RealTech Laser 400

New 11-by-17-inch PostScript printer with 300-dpi or 400-dpi output and 35 built-in fonts. Includes 4MB of RAM, SCSI port, and two trays. $3995. MicroBusiness Solutions, 409/539-3959.

ZPS-150cxi

150-watt autoswitching power supply upgrade for Mac IIcx and IIci. Functions exactly like original power supply but provides an extra 50 percent of power. $349. Quadmation, 408/733-5557, 800/733-7887.



ZPS-150cxi

SOFTWARE

Auto Scheduler Generic Version

Sports-scheduling software automates scheduling of games for one or more leagues, for any sport, for several fields or courts at once. System 7–compatible. 1MB min. memory. $249. Amalgamated Software, 612/649-4481.

Bandit Kings of Ancient China

Strategy game in which one to seven players roam the medieval Chinese countryside as bandit kings in four separate scenarios. System 7–compatible. 1MB min. memory. $59.95. Koei Corporation, 415/348-0200.



Bandit Kings of Ancient China

Best Foot Forward

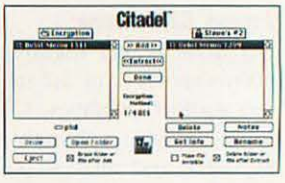
Database of more than 750 hiking trails on state and federal land in Washington State. Each description includes elevation and mileage, trail highlights, directions to trailhead, hazards and restrictions, and the addresses and telephone numbers of the nearest USGS information offices. Most descriptions also include map of area surrounding the trailhead. Oregon and California versions are planned as well. System 7–compatible. 512K min. memory. $89.95. GrizzlyWare, 206/487-3918, 800/258-4453.

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HyperCard-based money-management tool features instant summation of current holdings in any one investment by a client. Calculates the average cost per share and the current expected net profit, before and after commission, of liquidation. Handles seven dossiers per client portfolio for stock shares, bonds, mutual funds, options, direct investments, CDs, and other investments; provides mail merge. System 7–compatible. 2MB min. memory. $777. Quintessential Software, 509/779-4488.

Citadel

Data-security product includes document shredder, Virex INIT virus checker, password protection and locking on hard drives and floppy disks, and file encryption. 512KE min. memory. $149.95. Microcom, 919/490-1277.



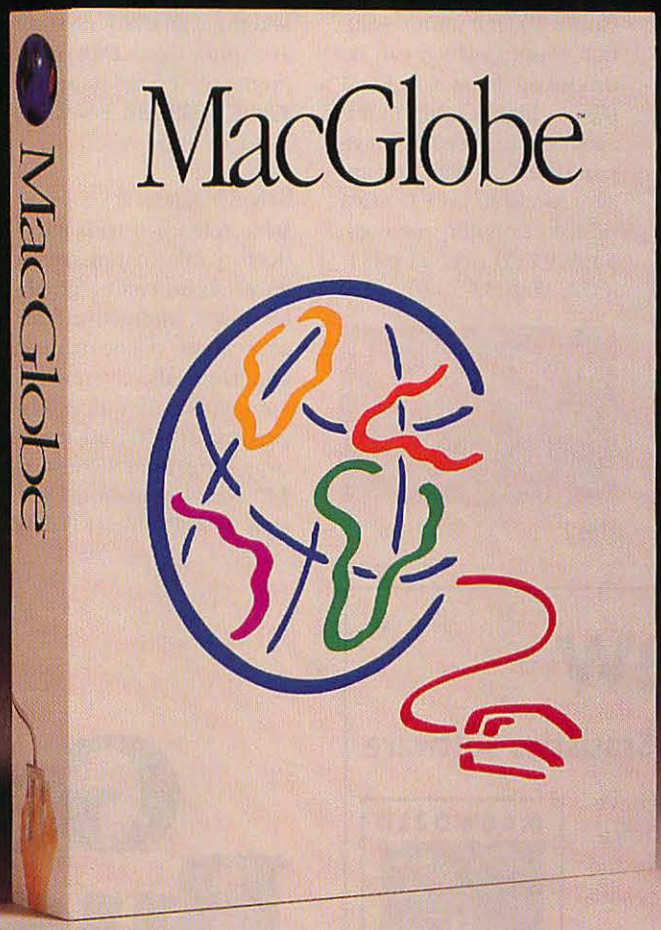
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DiskMaker

Universal hard drive formatting program guides users through partitioning

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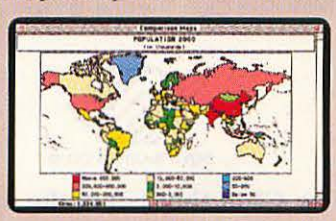
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during setup; includes online help. Users can mount partitions automatically at start-up or later on command. Includes password protection for partitions. System 7–compatible. 1MB min. memory. $89. Golden Triangle, 619/279-2100.

Drive7

Updating and formatting utility allows users to update hard drives for System 7 regardless of original formatting software. Supports virtual memory on removable media. System 7–savvy. 1MB min. memory. $59.95. Casa Blanca Works, 415/461-2227.

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Data-acquisition and -control system for chromatographic applications. Works with any type of gas chromatograph, autosampler, or high-pressure liquid chromatograph equipped with either RS-232C or IEEE-488 interfaces, or with an analog output. Performs real-time analysis. System 7–compatible. 1MB min. memory. Prices start at $2995. WillStein Software, 708/256-2895.

Holy BibleStack II

Bible reference with introductory information, reference tables, charts, graphics, maps, interactive table of contents, online manual, and tutorials. System 7–compatible. Requires HyperCard 2. 2MB min. memory. King James Version $40; New International Version $70; Parallel KJV/NIV $100. Holy Mountain Software, 813/951-0246.

INITInfo Pro

HyperCard stack tracks INIT, cdev, and other system conflicts; identifies application incompatibilities; and prints custom reports listing problems and fixes. System 7–compatible. 2MB min. memory. $69.95. Baseline Publishing, 901/682-9676, 800/926-9677.

JobTracker

Production-scheduling system for publishers of books and periodicals allows input of production steps with estimated duration for each step. 2.5MB min. memory. $695. InfoSolutions, 814/355-2983.

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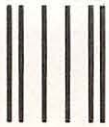
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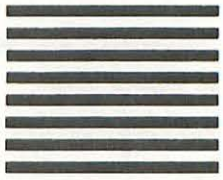
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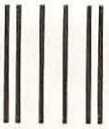


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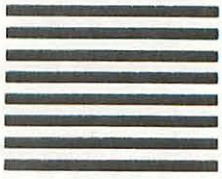
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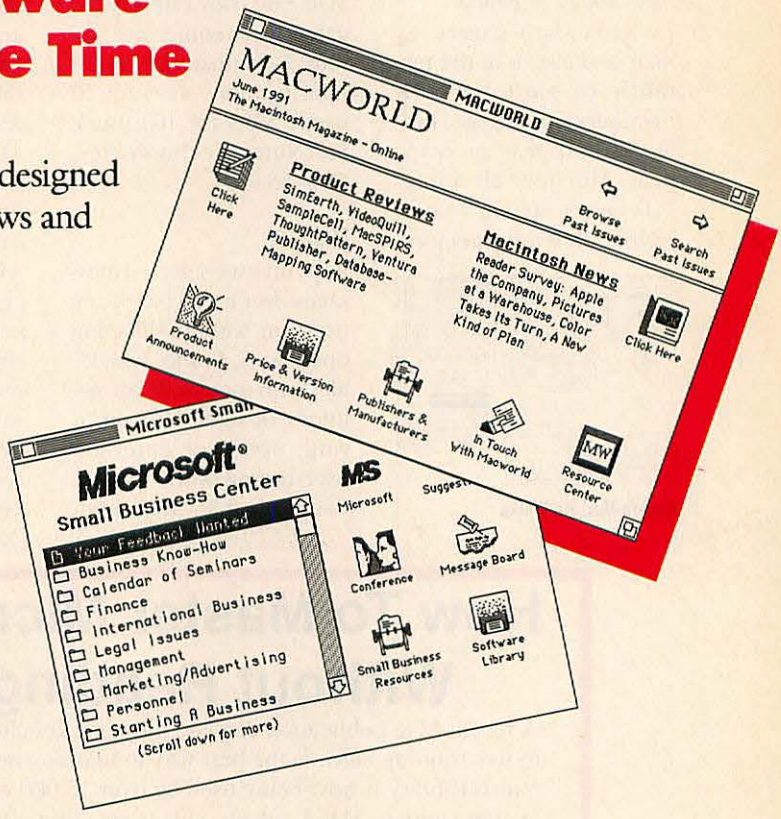
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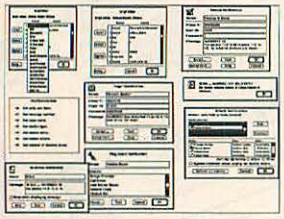
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to high-resolution gray-scale effects using a dithering technique. Does not require Color QuickDraw or 32-bit QuickDraw support. Assembly source code included. $1600 licensing fee per application. Data-Pak Software, 206/573-9155, 800/327-6703.

Mac-to-Mac NetWorks

Uses standard pagers, E-mail, and alarms at the terminal to alert network managers if nodes on a network disappear or reappear. Monitors all AppleTalk nodes. System 7–compatible. 1MB min. memory.



Mac-to-Mac NetWorks

$695. Caravelle Networks Corporation, 613/596-2802.

Mail Link Remote

E-mail software gateway exchanges mail between local Mac network and one or more remote mail systems, including QuickMail, Microsoft Mail, and Unix mail systems. Runs on a Mac; one copy can serve as gateway for entire site. System 7–compatible. 2.5MB min. memory. $195 for 10 users; $995 for 100 users. StarNine Technologies, 510/548-0391.

MindSet

Pops up user-selected messages over menu bar of any program without affecting operations. Comes with 27 files with thousands of one-liners designed to motivate, uplift, or entertain user during work. System 7–compatible. 1MB min. memory. $59.95. Visionary Software, 503/246-6200, 800/877-1832.

Nabunaga's Ambition

Military-, economic-, and diplomatic-strategy simulation set in sixteenth-century Japan. One to eight players use resources, negotiating skills, and battle abilities to become shogun and rule Japan. Five skill levels. System 7–compatible. 1MB min. memory. $59.95. Koei Corporation, 415/348-0200.

Operation: Tsunami

Arcade action game in which player controls special agent who has been sent to neutralize assassins, giant insects, and armored robots in order to save the Asian continent from annihilation. Includes sound effects and music, 20 fully animated enemies, and 3 interconnected difficulty levels. 1MB min. memory. $39.95. Spph Software, 510/528-5122.



Operation: Tsunami

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- Types of Charts
- Patterns, Borders, Fonts
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Time-sheet-recording and billing system for Flexware includes unlimited time-sheet input, multiple sheets per person per period, flexible processing periods, and multioffice location capability. Handles billable projects and non-billable projects; tracks billing performance against targets and against project overruns. System 7–compatible. 2MB min. memory. $1195. Checklist Systems, 613/232-6119.

SalesForce Manager

Territory sales-management system with entry, list, customer, manufacturer, salesperson, and commission modes; instant access to historical data; and ability to track open orders and back orders. System 7–compatible. 1MB min. memory. $349.95. Kracom Computer Services, 708/392-4967.

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Software for calibrating color scanners to the user's monitor. Reads and writes TIFF and PICT2 files; Photoshop- and ColorStudio-compatible. Includes reflective color target; is compatible with calibrated monitors from SuperMac, Barc, Radius, and RasterOps; and with color flatbed scanners including the Microtek MSF 3002; the Sharp JX300, JX450, and JX600; and the Howtek Scanmaster. System 7–compatible. 2MB min. memory. $149. Savitar Communications, 415/243-3030.



ScanMatch

Search Files

Shareware searches for all files containing a given string in any selected folder, lists files, and shows string's context. Opens found files with appropriate application under System 7. 1MB min. memory. $12. Differential Development, 617/628-3189.

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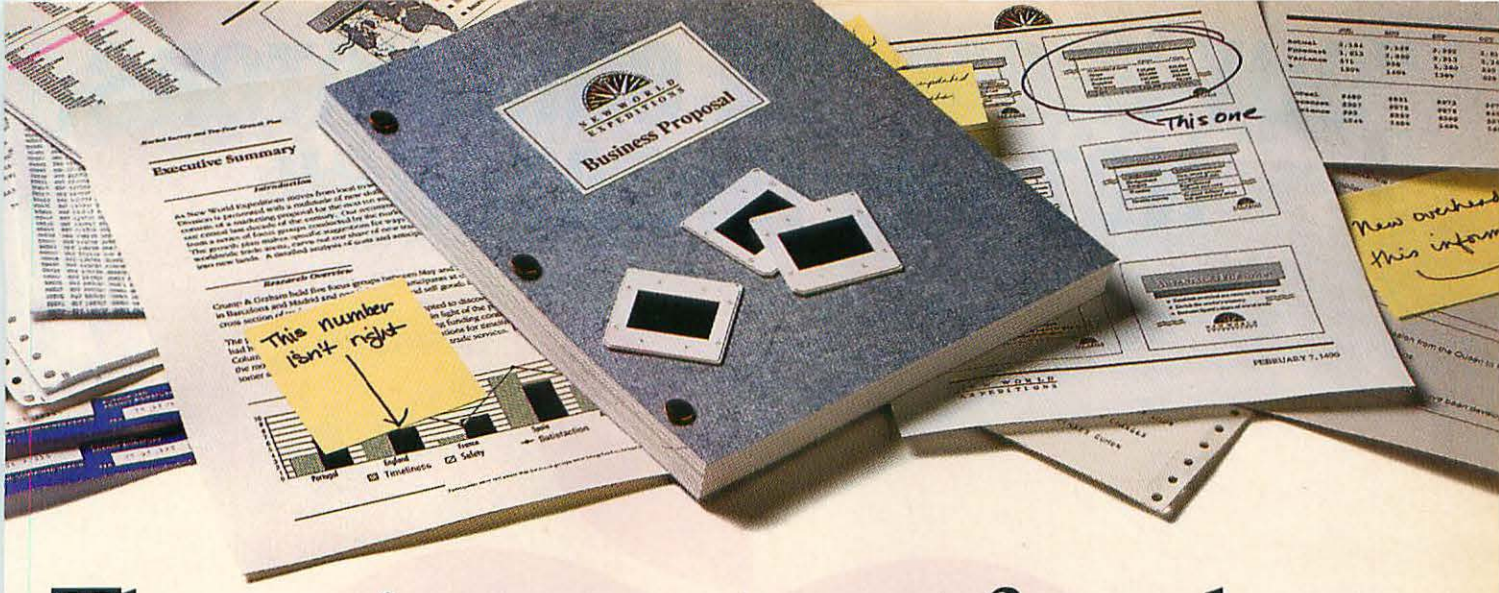
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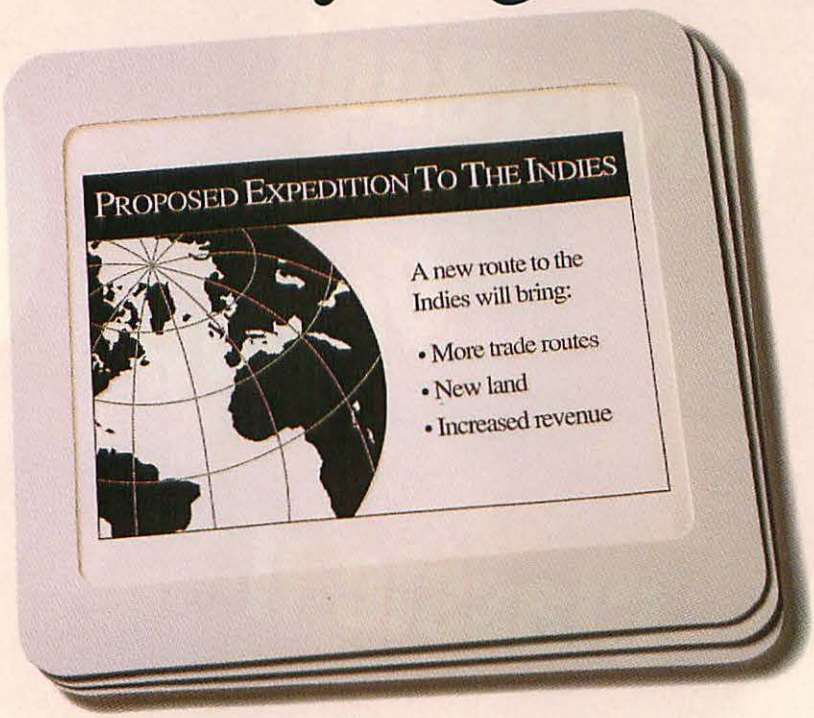
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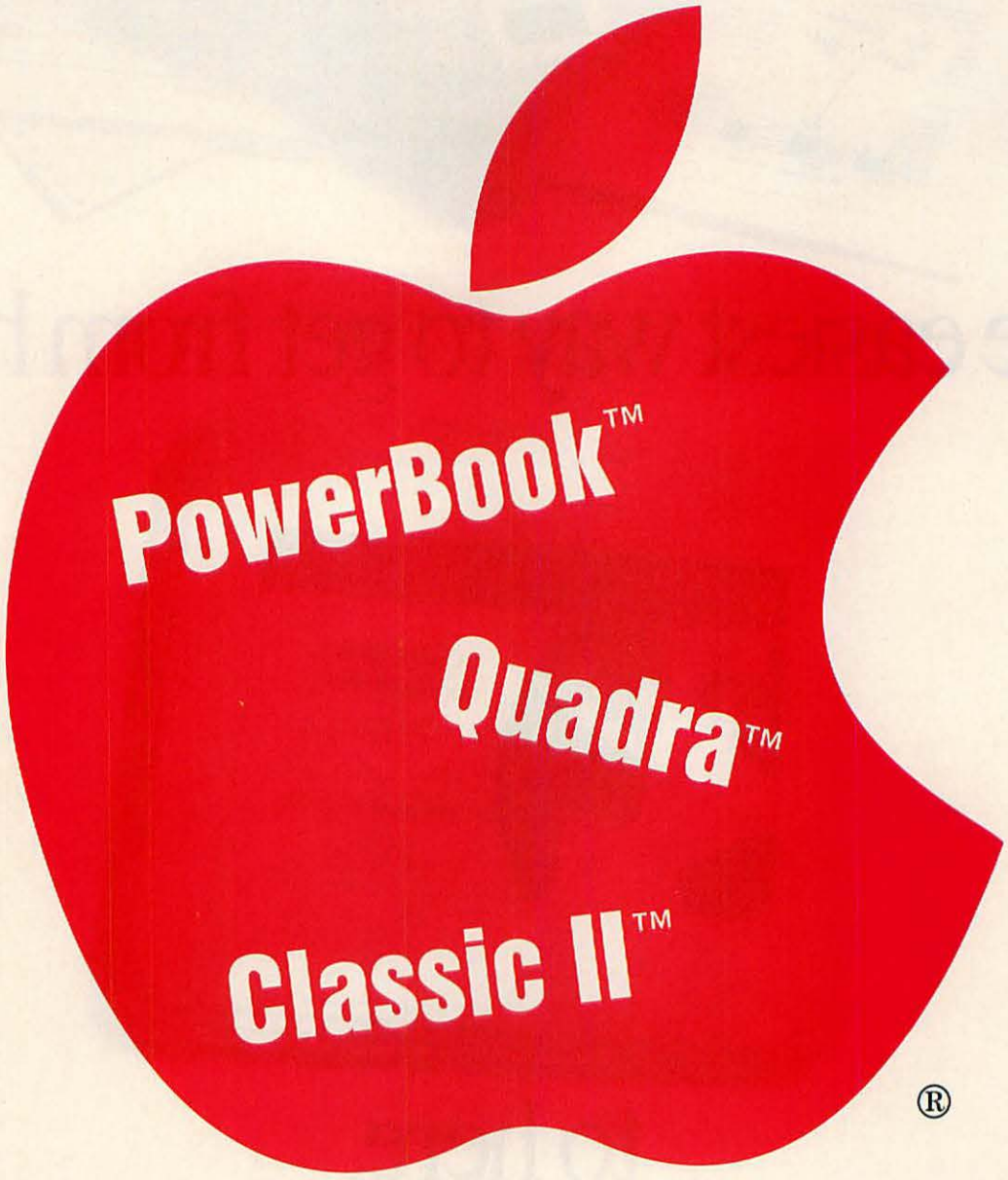
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Tigre Programming Environment

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VersionTerritory

Network-updating utility enables network managers to upgrade all or selected computers to System 7 on a network from one machine. Timed updates can be scheduled to operate after work hours. Any problems encountered with individual Macs are indicated as they occur and logged for inclusion on reports. System 7–compatible. 1MB min. memory. 10-user package $199; 25-user package $499; 50-user package $699; unlimited-user package $1999. SoftWriters, 512/244-3999, 800/676-3919.

XGator

X Windows–system client for the Macintosh; lets Mac desktop appear on screens of Sun, DEC, and other workstations running X Windows. Features include screen sharing, cut-and-paste between Mac and Unix applications, and encrypted password protection. $495. Cayman Systems, 617/494-1999.

X-oR

MIDI editor and librarian allows user to take snapshot of entire MIDI system for total recall. Automatically switches any MIDI patch bay for easy system control. System 7–compatible. 1MB min. memory. $399. Dr. T's Music Software, 617/455-1454. M

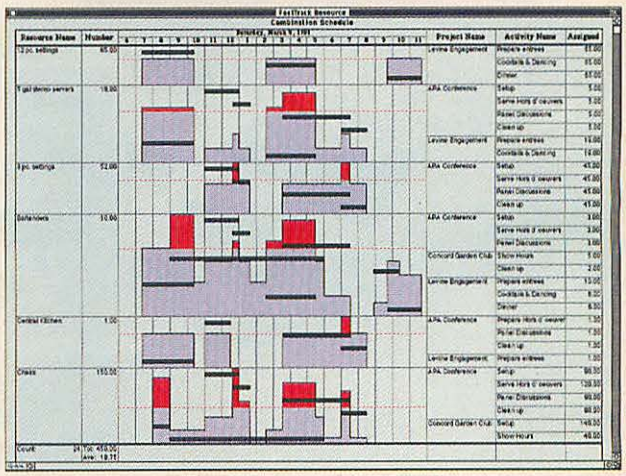
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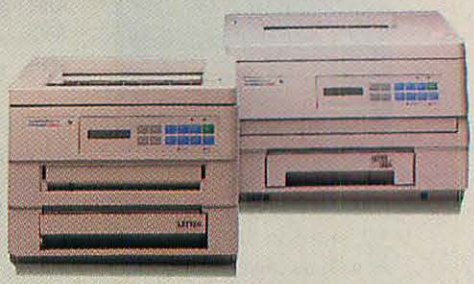
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Quick Tips

System 7 woes, scanning with a fax machine, making HyperCard rulers, and more

BY LON POOLE

A Mac IIcx, IIci, or any Mac with a lockable power switch will restart itself if you inadvertently lock the switch in the "on" position by rotating it while switching the computer off (as described in July's *Quick Tips*). But the problem may not be as superficial as it seems. The power supplies in all Mac II models contain a mechanism that turns on the computer when someone presses the Power On key. If that mechanism malfunctions, the computer can turn itself on without any help from the outside world. According to Vern L. Mastel of Bismarck, North Dakota, when this happened at work, the only cure was to replace the power supply.

System 7 a Rip-Off?

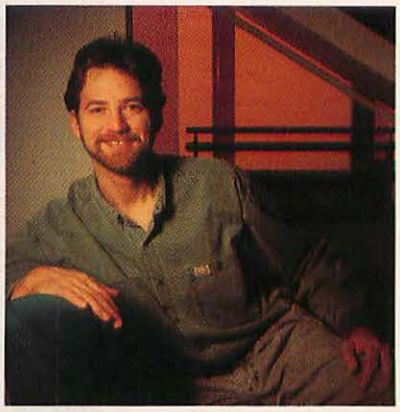
Q I have heard about System 7 for a long time and was excited about it until I bought it yesterday. Following the instructions, I used the Compatibility Checker before installing the new system. The resulting news is that I don't have one program compatible with System 7! The programs that I use most are WriteNow 2.2, Microsoft Works 2.00a, and MacMedical. All are now obsolete. I also use Publish It Easy, The Print Shop, MacPaint, MacroMaker, and several DAs. There are also a few games such as MacGold, Gold, and some others.

Am I naive in expecting Apple to protect my investment? This actually looks more like a collusion between Apple and software developers to get more sales. I will have to either do without System 7 or spend hundreds of dollars for updates—if they become available—or thousands of dollars for new programs. This is a game for rich people or computer magazine writers with a lot of company support.

I am frustrated and angry to be so hoodwinked and feel that the truth should be stated. Anyone thinking of getting System 7 must realize that it's like going from a DOS system to Macintosh. I did that once for business reasons and it cost me thousands of dollars. But I have no reason to dump the programs I now have.

Gordon E. Riddle
Orleans, Ontario, Canada

A Compatibility Checker does seem to confuse people. Contrary to its goal of aiding in a smooth transition to System 7, its report apparently gives some people the mistaken impression that none of their software will work with System 7. In fact, you can use all items that Compatibility Checker identifies as "compatible" or "mostly compatible" (for example, Write Now 2.2 and MacPaint 2.0) without upgrading. You only have to get new versions of items Compatibility Checker classifies as "must upgrade" for System 7 (Microsoft Works 2.00a in your case). Programs listed as "Not avail." (in your case, MacMedical, Publish It Easy, The Print Shop, MacGold, and Gold) may be compatible or they may not—Compatibility Checker does not know. You can either contact the publisher of each product or simply try each one with



System 7. When I called publishers, Brøderbund said The Print Shop 1.3.2 is compatible, and TimeWorks said Publish It Easy versions 2.1 and later are compatible. I couldn't determine who published MacGold or Gold.

Upgrading software is not necessarily expensive. Microsoft will upgrade Works to the latest maintenance release (2.0e at this writing) free of charge; just call 800/426-9400 and have your Works manual or original program disk handy. The same policy applies to other Microsoft software. For $25 Claris will upgrade an old version of MacPaint, to MacPaint 2.0; call 408/727-8227 (Customer Relations) or 800/544-8554 (Upgrades). For an upgrade to The Print Shop Mac 1.3.2, send your program disk and $7.50 to Brøderbund, 17 Paul Drive, San Rafael, CA 94903-2101. TimeWorks will upgrade Publish It Easy 2.0X to version 2.1, which is compatible with System 7, for free; just send in your program disk. Upgrading from version 1.1 costs $49.95.

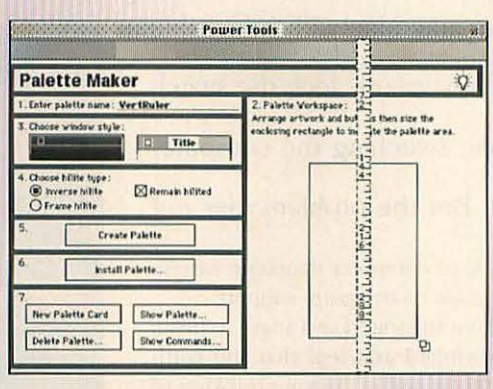
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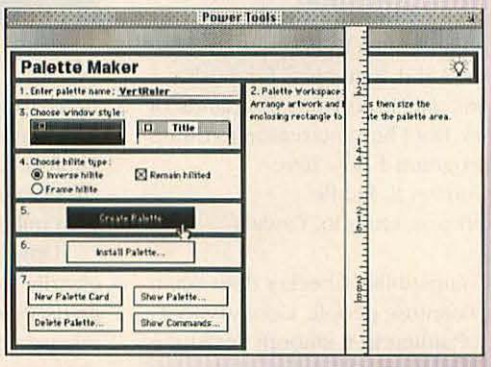
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HYPERCARD RULERS

Although you use HyperCard as a paint program to make pictures and as a layout program to position objects on cards, it does not include rulers. This tip, submitted by Jean-Jacques Greif of Paris, France, shows you how to create your own. You'll need the Power Tools stack that comes with the complete version of HyperCard—the HyperCard Development Kit from Claris (not the version bundled with your Macintosh). Power Tools helps you make palettes and other HyperCard objects. These palettes are meant to carry buttons, but nobody says you can't design buttonless ruler palettes. Ruler palettes float above all stack windows and you can move them like old-fashioned wooden rulers.

1. Click the New Palette Card button, enter a palette name, and choose a window style. Then use HyperCard's painting tools to draw the ruler on the new Palette Maker card. You can draw over anything on the card because you're in the card layer, and everything else is in the background layer. You can also take a snapshot (press ⌘-shift-3 or use Mainstay's Capture utility) of a ruler in another program, cut out the ruler, and paste it onto the Palette Maker card. Use a paint program or TeachText 7.0 to cut out the ruler.





2. Adjust the size and position of the enclosing rectangle to fit the ruler. When enclosing a vertical ruler, allow extra width at the left so the palette's title bar will be wide enough to drag. Click the Create Palette button to make the palette, and then the Install Palette button to put the palette in a stack. Installing the ruler palettes in the Home stack makes them accessible from any other stack.



3. Use HyperTalk's Palette command to show a ruler palette. For example, type **palette "HorizRuler"** in the Message box to show the HorizRuler palette. You can also create a Rulers menu using the Power Tools stack.

many System 7 capabilities, including TrueType, opening multiple programs concurrently, a customizable Apple menu, color windows and icons, Finder aliases, and all other Finder improvements. You can also use file sharing and virtual memory with most programs. Fewer programs work with 32-bit addressing turned on, though many do. (For information on System 7 capabilities, see "Confessions of a System 7 User," *Macworld*, July 1991.)

Upgrades that take advantage of System 7's balloon help, publish and subscribe, program linking, and data access generally cost more because they take quite a bit of work to implement. Most software developers charge between $50 and $150 for major upgrades like these. So taking full advantage of System 7 will eventually cost you some money. You have to decide whether the benefits of a major upgrade are worth the cost, but comparing the total cost with switching from DOS to the Mac overstates the case more than a little.

Can't Open Folders

Q With MultiFinder on and a program open in addition to the Finder, I can't open any folders on my 5MB Mac IIcx. If I try, I get the message "The folder/disk couldn't be opened (out of Finder memory)." Using the About the Finder command reveals that the Finder is using about two thirds of 160K and the System is using about two thirds of 1535K. I used CE Software's Widgets utility software to increase the system heap size to 540K larger than normal. I've considered using ResEdit to change the application memory size of the Finder, MultiFinder, or both. Any suggestions?

Tim Murray
Boca Raton, Florida

A You need to increase the Finder's memory size. Because you're using a version of System 6, you simply select the Finder icon inside the System Folder, choose Get Info from the File menu, enter a larger memory size in the space provided, and restart your Mac. Doubling the memory size to 320K is probably sufficient; the more you increase it, the less memory you'll have for opening other programs.

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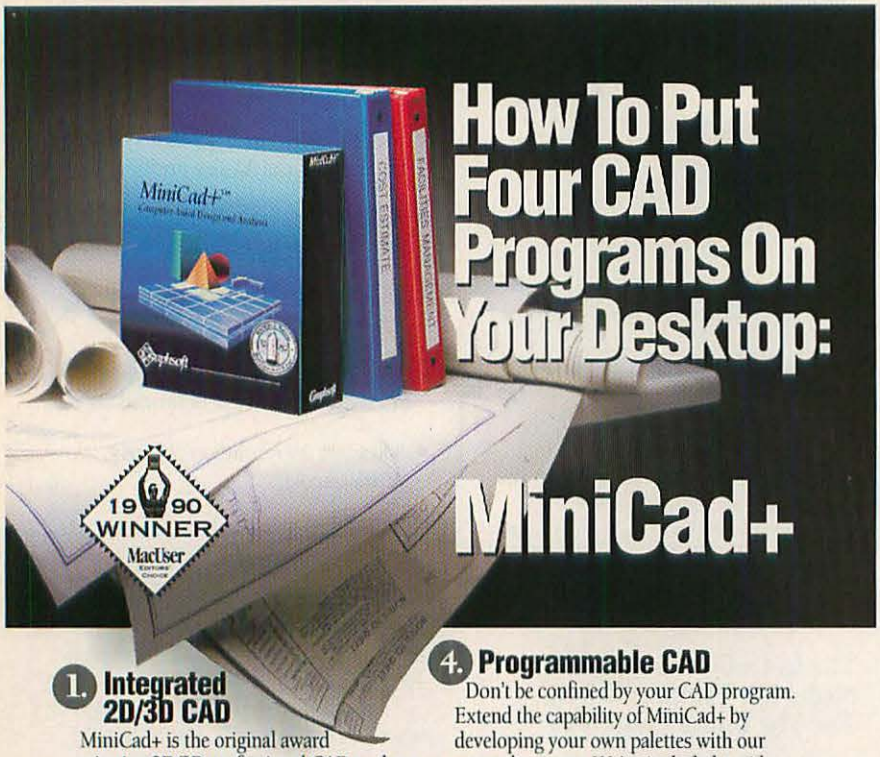
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QMS ColorScript 100 Models 10 and 30*i* shown.

Upgrading to System 7 would probably also cure your trouble, because Finder 7 can usually borrow from the system area of memory when the need arises. If you get a message that there isn't enough memory to use a control panel or open a folder, try quitting a program. If that doesn't help, you must restart your Macintosh to fix the memory shortage.

Finder 7 won't let you set its memory size with its Get Info command. You can work around this situation by restarting with a version of system software older than 7.0. Then open the System Folder on your System 7 start-up hard drive, select the Finder, choose the Get Info command, enter a larger memory size, and restart with your System 7 disk.

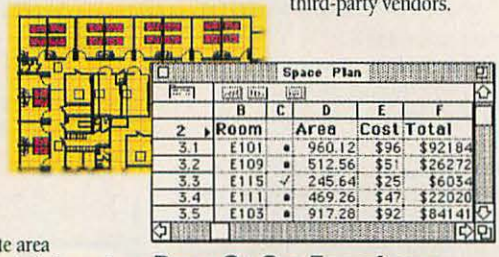


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Fax Scan

Q Can I use my standard fax machine to scan a printed document into my Mac, saving the cost of a scanner?
Chuck Foster
Napa, California

A You can "scan" any printed image on your standard fax machine and send it to a fax modem with receive-fax capability that is connected to your Mac. What you get from a receive-fax modem is a fax-quality (192-dpi) graphic image—not 300 dpi nor gray scale like most of today's conventional scanners, and not text that you can edit with a word processor. You can save that graphic image on a disk. You can also convert text in the graphic image to editable text using optical character recognition (OCR) software such as the $795 OmniPage from Caere (408/395-7000 or 800/535-7226) or the $595 Read-It O.C.R. from Olduvai (305/665-4665).

Of course, if you've got a fax modem, you can use it to directly send Mac-generated correspondence to any fax machine. You don't have to print a copy and run that through a standard fax machine to send it. All fax modems have this send-fax capability, but not all have receive-fax capability. (For a roundup of fax modems, see "Fax Modem Facts," August 1991.)

Microsoft Word 4.0 Bug

TIP: Microsoft Word 4.0 has a serious bug that could obliterate the entire contents of an Untitled window (that is, a new document that has never been saved). The bug is easy to reproduce. Create a new Word document, choose Page View from the Document menu, choose Open Header or Open Footer from the Document menu, and then open any existing Word document. Presto! The untitled document is gone for good.

Microsoft acknowledged the bug but admitted that there may never be a fix for Word 4.0. They did, however, claim that version 5.0 won't have this problem. Let's hope not.
Criss Laidlaw
Shelburne, Vermont

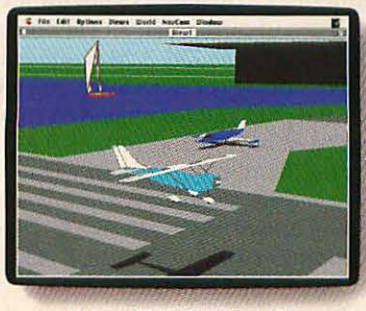
The moral of this tale applies to all kinds of documents: Save soon and save often. By the way,
(continues)

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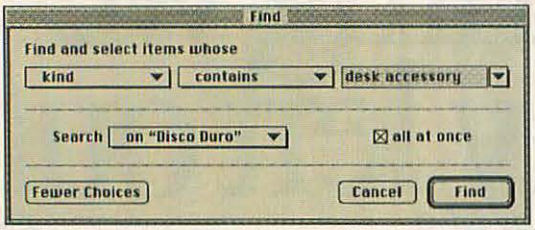
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SELECT ALL APPLICATIONS **You can select all application programs on a disk (in preparation for making a batch of aliases) by setting up the Finder's Find command as shown here.**

I was able to reproduce this bug using standard (default) Word settings using version 4.0D, the latest version at this writing. Curiously, the bug did not occur when I used my personalized settings, which reflect custom menus I made with the Commands command in the Edit menu.—L.P.

An Alias for Every Program

TIP: If you're a System 7 user, creating an alias for every program on your hard disk sounds like a good idea—but searching all your folders for applications quickly gets tedious, unless you let the Finder's Find command select the applications for you. In the Find command's dialog box, click the More Choices button to get the expanded Find dialog box. Set it up to find and select all applications at once, as shown in "Select All Applications." Click the Find button to have the Finder select all the applications as a group. Then choose Make Alias from the File menu to have the Finder make aliases for all the selected applications. Next, deselect the applications and select the aliases. You can easily drag the selected aliases as a group to the desktop or to a special folder you created in advance. Now you can open any application by opening that folder and double-clicking the application's alias.

Christian Boyce
Beverly Hills, California

For best results, drag the newly created aliases to the desktop or to a folder on the same disk. If you drag them to a folder on another disk, the Finder copies them and leaves the originals in place and not selected. Then you will have to reselect them before you can trash them.—L.P.

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Lon Poole answers readers' questions and selects their tips for this column. His most recent books are Amazing Mac Facts *(Microsoft Press, 1991), a collection of the best published tips; and* Macworld Guide to System 7 *(IDG Books Worldwide, 1991).*

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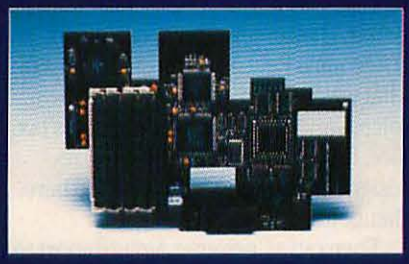
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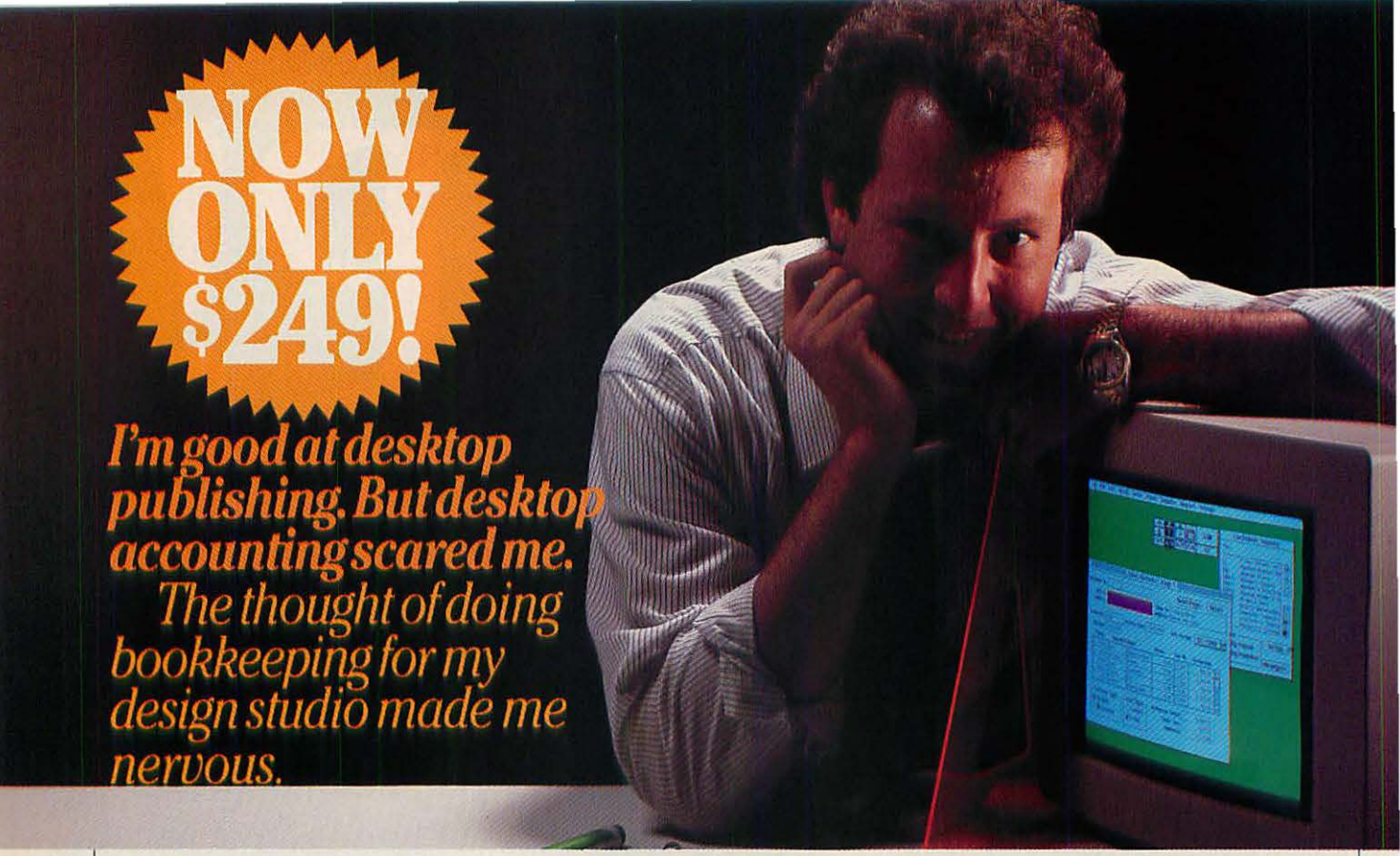
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Circle 294 on reader service card



I'm good at desktop publishing. But desktop accounting scared me.

The thought of doing bookkeeping for my design studio made me nervous.

When I heard "balance sheet," I broke into a sweat. I know type, advertising, printing. Now I was forced to do our books.

No choice.

We were on our third part-time bookkeeper in eleven months, and she was called away suddenly. Sound familiar?

But I'm the boss and the buck stops with me. We had bills to pay, payroll checks to write, invoices to send, taxes to set aside.

New System 7 features!

And deadbeats to collect from–only I had no idea who owed us how much or for how long. Some suppliers may have even thought of *us* as deadbeats. I needed to know our cash flow, and get a handle on all this. But I didn't have a lot of time.

Step one: find an accounting program that feels as familiar as our Macs, that starts out easy, but has lots of reserve firepower for later on.

I found atOnce! The manual looked orderly. I dug in...

The familiar with the unfamiliar

atOnce! starts you off with a tutorial that uses HyperCard, one of my old favorites. I was at home.

Numbers are my nemesis, but the tutorial was actually fun and got me comfortable. It takes you step by step through the program, and gives you some easy-to-swallow accounting basics so you're not reading a foreign language. There's context-sensitive help, just in case.

And while you learn, you can start to set up your books. So it doesn't come in a flash and you sweat a little. But you do it and you learn.

I started off light. Double-clicked on one of the default charts of accounts and my General Ledger was practically set up for me. Then entered a few client names in Accounts Receivable, to get an idea of what was coming in. Prepared six invoices–and atOnce! calculated sales tax. Nice. Printed the invoices which I redesigned in atOnce!–realign a field here, change a font there. The usual.

Then ran a Customer Aging Report to identify the slow-payers (I had no idea such a terrific thing was even possible).

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Getting Started with Enhancing and Printing Images

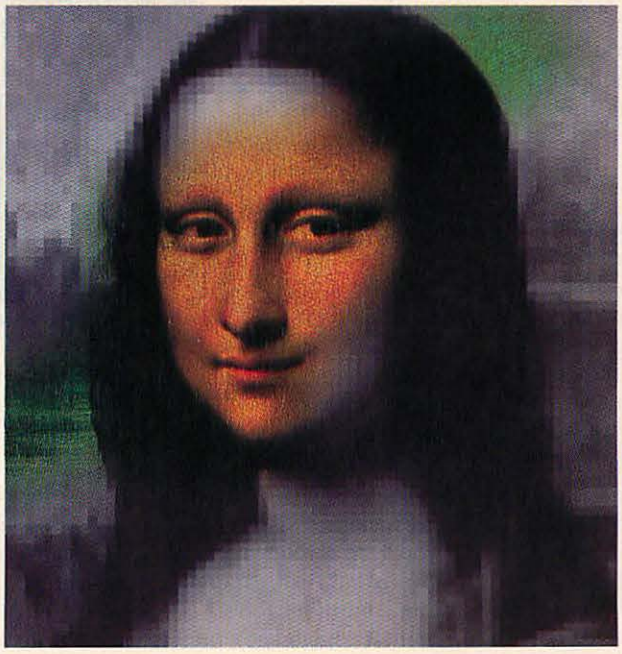
How to get the best results when putting pictures on paper

BY JIM HEID

In last month's column ("Getting Started with Image Processing") I examined the basic tools and techniques of electronic photography—including scanners, still-video cameras, video digitizers, and frame grabbers—as well as image processing programs such as Adobe Photoshop, Letraset's ColorStudio, Aldus Digital Darkroom, and MicroFrontier's Enhance, which let you modify images.

Imaging hardware and software are remarkable, but getting high-quality results from them requires knowledge and experience. Many novices are disappointed by their initial efforts; after a few days with a new scanner, you might think that a lot of the words a picture is worth have four letters.

This month I examine some of the advanced features in image processing programs, and I show how to get the best results with gray-scale images.



Getting Good Grays

One common pitfall of gray-scale scanning (and of black-and-white photography) is the failure to capture a complete range of gray tones. An image should have a wide distribution of grays, from white for bright areas such as highlights to black for dark areas such as shadows. In between those extremes are the *midtones*—the light, medium, and dark grays that represent most of the image's details. An image whose range of grays is too narrow lacks contrast and is often described as *flat*. An image that has bright whites and dark blacks but few midtones is overly contrasty and doesn't show details well.

The best way to get an ideal range of grays in a scanned image is, of course, to scan a photograph that has them already. Similarly, if you're capturing an image with a video camera, the key is to light the subject properly—for example, diffused light produces less contrast than direct sunlight does. Often, however, you must make do with substandard photos or lighting. With photography, a darkroom technician can compensate for contrast problems when printing an image. With scanned images, you can improve contrast by using an image processing program.

Most image processing programs have brightness and contrast controls, on-screen sliders that let you adjust the overall brightness and contrast of an image or a part of it. Many desktop publishing programs have brightness and contrast controls, too. But these controls, while enhancing one aspect of the image, often cause degradation elsewhere. If you

(continues)

boost brightness to bring out shadow details, the light areas of the image become washed out and their details disappear. Similarly, if you increase contrast, details are lost in both light and dark areas.

A better way to improve brightness and contrast involves using one of the contrast-adjustment features I mentioned last month: a *gray-map* graph. Its horizontal axis shows the original brightness values in the file—the *input values*—and its vertical axis shows the new brightness values, or the *output values*. By altering the shape of the graph, you tell the image processing program to assign new values to the image's underlying data, thus changing its brightness and contrast (see "Working with Grays"). When you draw a custom gray-map curve, you're performing *nonlinear* correction—altering the data in varying degrees to improve the image's appearance. Using a brightness or contrast control involves *linear* correction—remapping all the values to the same degree, which can lead to loss of detail in bright or dark areas.

You can also use a gray-map graph to create special effects. Draw a V-shape line, for example, and you get a *solarized* effect like that produced in a darkroom when a developing print is briefly exposed to light.

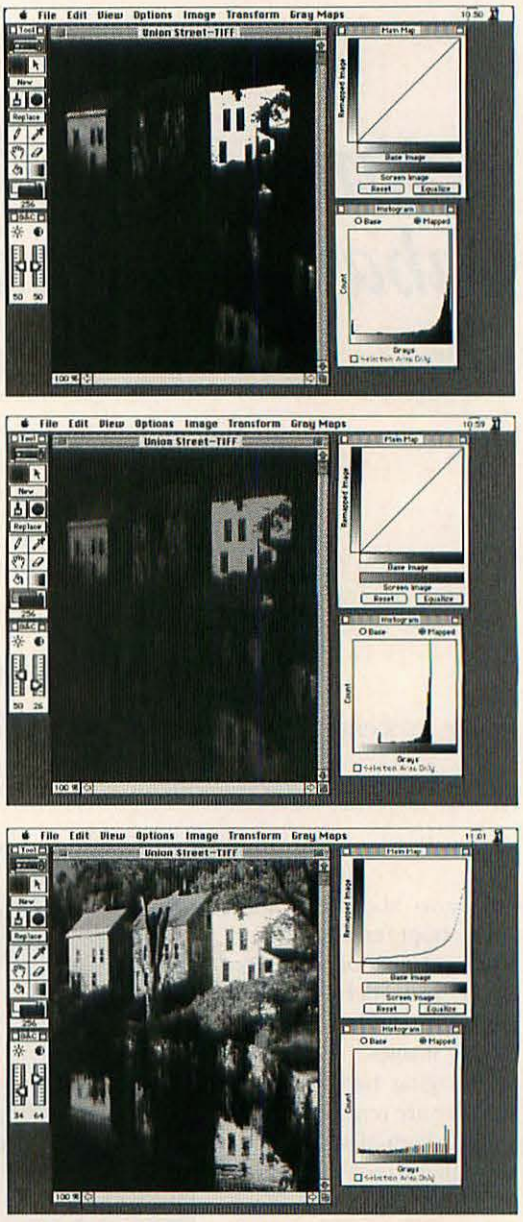
A Graph of Grays

One particularly powerful correction aid is a *histogram*, a bar chart that shows to what degree each gray shade appears in the image. You can use it to determine the kind of correction an image needs and to judge the effectiveness of your correction techniques. Generally, an image's histogram bars should form a fairly smooth curve (see "Working with Grays"). If most of the bars are at the left or right end of the chart, the image is probably too dark or too light. If the histogram looks like a mountain range alternating with plains, the image probably has too much contrast. A flat image's histogram is narrow, with most of the bars appearing in the midtone area and few or no bars at the black and white ends of the graph.

In many cases, improving mediocre image quality doesn't require fiddling with contrast controls, gray maps, or histograms. Most programs have an Equalize command, which mathematically adjusts the image's data to produce a more even range of light and dark shades. Examine a histogram after equalizing, and you'll see that it reflects a broader range of grays.

Brightness and contrast controls, gray-map graphs, histograms, Equalize commands—how do you decide which correction scheme to use? Try the Equalize command first. It's the easiest of the four techniques, and it's often all you need. If it isn't, the Undo command puts you back to square one, where you can try the other techniques, relying on the histogram and your eyes to get the results you want.

If you'll be retouching an image using the paintbrush, smudge, rubber-stamp, and other tools I covered last month, fix the image's brightness and contrast problems before retouching. Adjusting grays after retouching can result in odd splotches of gray and other undesirable artifacts. Also remember that some image processing programs let you save gray-map curves and apply them to other images. This can be a big time-saver if you're working with numerous images that share the same brightness and contrast characteristics.



WORKING WITH GRAYS **Brightness and contrast controls and gray-map graphs let you finely tailor brightness and contrast, and histograms let you view the distribution of gray levels. Top: The original image with brightness, contrast, and gray map unchanged is too dark—note the histogram shows more dark shades than light ones. Middle: An image lacking contrast appears flat, and its histogram correspondingly lacks values at the light and dark ends of the spectrum. Bottom: Brightness and contrast have been tweaked and the gray map altered to produce a more appealing image with a wider distribution of grays. Aldus Digital Darkroom was used here.**

Filtering

Histogram and gray-mapping features alter an image's grays; *filters* alter the image itself. By applying calculations to the image's underlying data, a program can modify the image.

Some filters enhance image quality—a sharpening filter, for instance, can bring out details lost during scanning. Others produce special effects, and Photoshop's lead the pack. Its Motion Blur filter simulates motion by blurring the image in a single di-

(continues)

MANAGE the unmanageable

Ray Pedden hadn't felt so much in the hot seat since he completed his Air Force tour of duty in Vietnam.



As Director of Operations for Stanford University Clinic, he was responsible for replacing their existing computerized systems with more sophisticated technology.

The project was both complex and risky. The accounts receivable contained $38 million, a perishable asset for which significant losses could be incurred if the conversion were not 100% effective. The last time the system was updated, millions of dollars had been lost, as well as the jobs of those responsible. Understandably Ray was nervous.

He turned to the professionals at Micro Planning International for assistance. An MPI consultant worked with Ray's team, the new system vendor, and an independent health care consultant, to coalesce their views of the project into one workable plan - acceptable to all involved. He trained team members in the principles of project management, as well as how to use MPI's state-of-the-art software to control the project. The plan was revised to resolve resource conflicts and a suite of custom reports for monitoring the project was developed.

Stanford Clinic's new Management Information System was up and running December 3, on target.

In Ray's own words, "I couldn't have done it without MPI. The consultant was an experienced professional and the software unparalleled in ease of use and sophistication."

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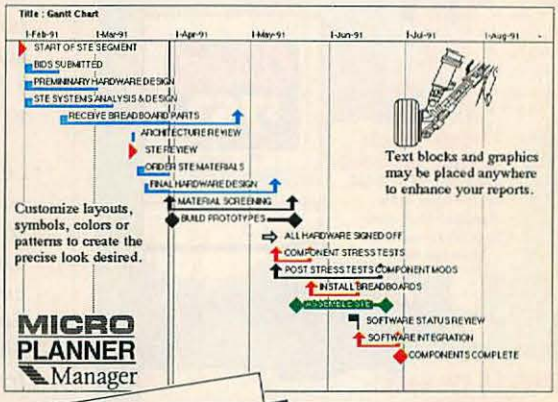
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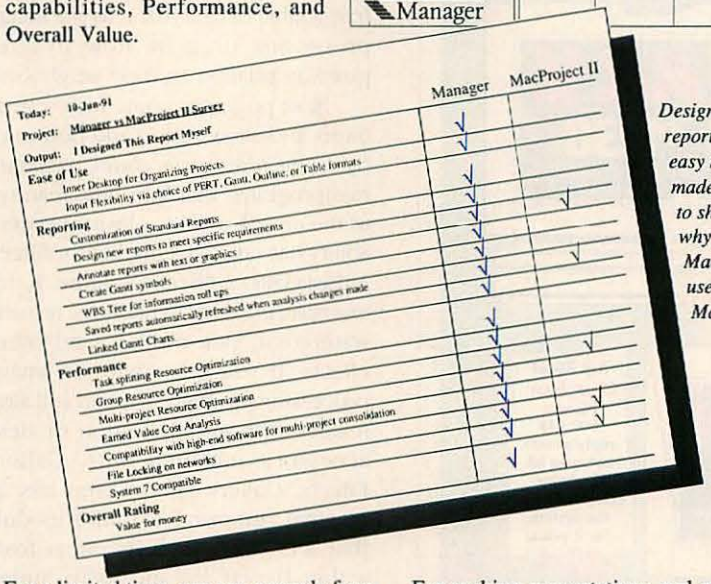
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rection, and the Zigzag filter creates rippling effects—as if viewing an image through water. The Pointillize filter makes an image look like it was painted in a pointillist style. The Swirl filter simulates an image's journey into a whirlpool, and the Spherize filter simulates a fish-eye lens or a Christmas-tree ball. You can spend hours exploring Photoshop's filters—and waiting for the results (it can take a Mac II–class machine half an hour to filter a large image).

Some filters hint at image processing's scientific applications—*edge-detection* filters alter an image so that only its edges appear, which can be useful for creating unusual embossed effects. Photoshop and Enhance also allow you to create new filters by editing a *convolution matrix*, a table of data that tells the image processing program how to alter pixels in relation to their neighbors.

Most programs come with several filters and allow you to add new ones by using *plug-in modules*, separate miniprograms that add new features to the program. This software expandability has created a market for filters. Aldus Gallery Effects Volume 1, for example, includes 16 filters for texture, watercolor, pen-and-ink, and other effects. If you don't have an image processing program, you can still alter images with an application or desk accessory included with Gallery Effects. Gallery Effects even has an external command (XCMD) module that lets you access its filters from within HyperCard and Aldus SuperCard. The filters work with Adobe Photoshop 2.0, Aldus Digital Darkroom 2.0, and Aldus SuperPaint 3.0.

(Note that plug-ins don't have to be filters. Some add new features to a program, such as a scanner driver that enables you to scan, enhance, and retouch within a single program.)

The Problems with Printing

You've tweaked grays, retouched scratches, and filtered an image into a digital masterpiece. The next step: printing. This is the stage responsible for most of the disappointment in desktop image processing. Because of the way printers handle gray-scale images, your printed results can't match the quality you see on the screen.

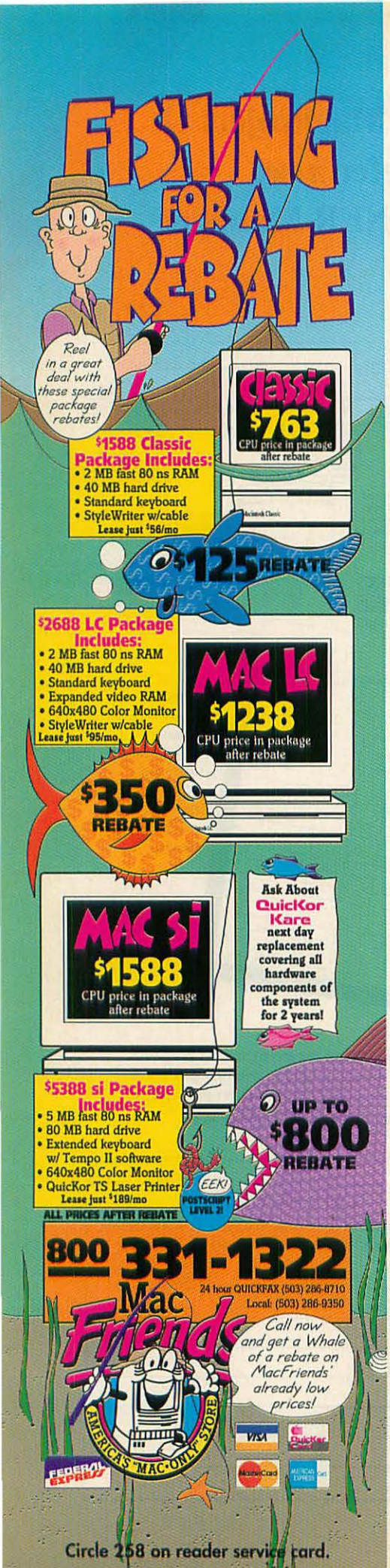
Several factors contribute to the disappointing look of printed images, but foremost among them is *halftoning*. Unlike monitors, printers can't produce shades of gray, but must simulate grays by using black dots of varying sizes. To create these dots, a printer combines the smallest dots it can create into clusters called *cells*, and then turns on varying numbers of dots within each cell. The number of cells per inch corresponds to the *screen frequency*, and is sometimes measured in lines per inch (lpi). (The term *screen frequency* derives from conventional photographic halftoning, in which an image is photographed through a special mask containing thousands of minute, regularly spaced holes.)

When dots are combined into cells, the printer's resolution plummets. A 300-dots-per-inch laser printer's ideal halftone screen frequency is only about 53 lpi—short of the 85-lpi screens often used in newspapers, and short of the 133- to 150-line screens used in magazines. Image processing and desktop publishing programs let you specify a higher screen frequency, but you're likely to be disappointed by the results. To create a halftone with more lines per inch, the printer has to use fewer dots in each cell. The fewer the number of dots in each cell, the smaller the range of grays each cell can represent. At 53 lpi, a 300-dpi printer can produce roughly 30 gray levels—barely enough. At 100 lpi, it delivers only 9 gray levels.

The key to better digital halftones is to print on a device with higher resolution, such as a 600-dpi or higher laser printer (see "High-Performance Printing," in this issue). A 600-dpi printer can produce attractive 85-lpi halftones. Better still is Apple's new PhotoGrade technology, which is built into the new LaserWriter IIf and IIg printers and yields 106-lpi halftones. Best of all, of course, is an *imagesetter*, which can produce magazine-grade, 120-lpi halftones.

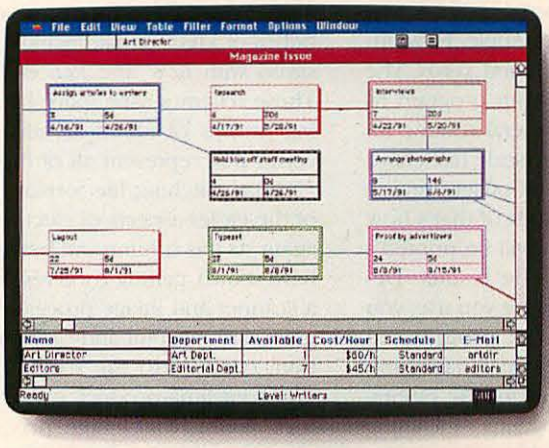
Many other variables influence the appearance of printed images. The printer itself is one: printers and imagesetters vary in their ability to accurately translate grays in an image to halftone cells on a page. Paper is

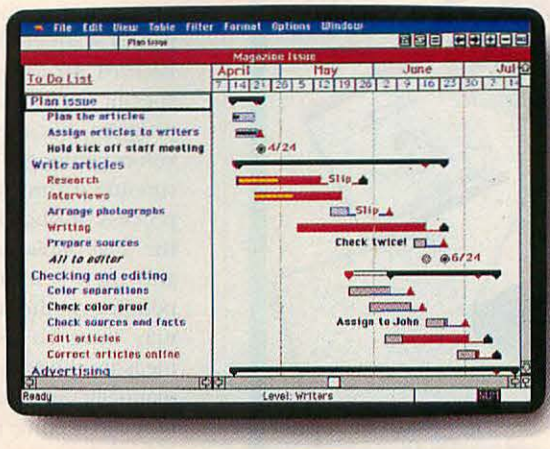
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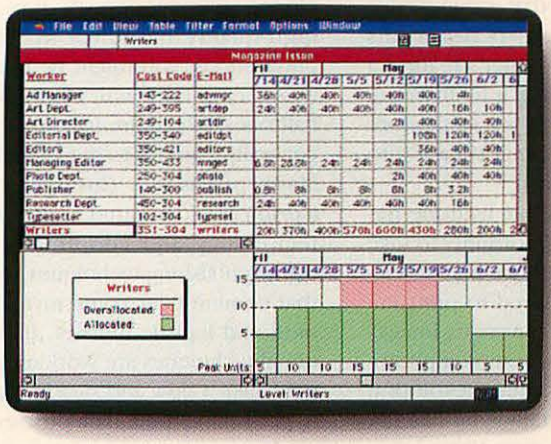


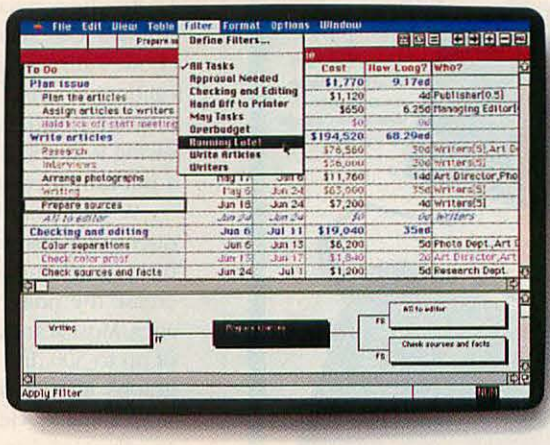
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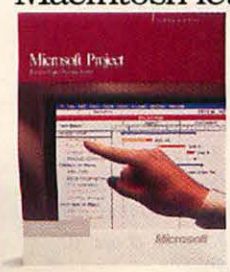








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another: every stock has unique texture and light-reflection properties. And if you photocopy a printed image or print it on an offset-printing press, you introduce still more variables.

To compensate for these, use image processing or scanning software to create a *printer-calibration curve.* This is a document whose data describes the relationship between grays in an image and grays that the printing process reproduces—it's a kind of gray map for printing.

You can create printer-calibration curves in MicroFrontier's Enhance and Aldus Digital Darkroom and with the scanning software that accompanies scanners from Apple, Hewlett-Packard, Abaton, Agfa, and Xerox. The specific steps vary from program to program, but the general routine involves printing a gray-scale test chart, running it through an offset-printing process or photocopier (if that's how the final publication will be printed), and then scanning the results. Depending on the software you use, you may have to use the program to measure the scanned gray shades and manually enter values for the calibration curve. Some programs—including Ofoto, the software that accompanies Apple's OneScanner—perform this chore automatically. After creating a calibration curve, apply it to an image just before printing it (or just before saving it, if you'll be importing it into a publishing program).

A laser printer's low halftone frequency creates an opportunity to save disk space and memory and to decrease the time required to print images. Most scanners can create images of up to 300 dpi, but scanning photographs at that maximum resolution wastes space. Generally, you can get excellent results by scanning photographs at a resolution twice the final halftone frequency—a 106-dpi scan for a 53-lpi halftone, for example, and a 240-dpi scan for a 120-lpi halftone. This is just a rule of thumb, however. For images without fine details, you can often get away with even lower scan-to-halftone ratios—as low as 1:1. (Always scan line art—anything without shades of gray—at the scanner's maximum resolution, since it isn't prone to the drop in resolution that occurs with digital halftoning.)

Storing It Away

Another storage-related issue involves choosing a file format for images. An old computer-industry joke says that the nice thing about standards is that there are so many to choose from. Image processing programs bear this out—all support several formats for images. Your goal is to settle on a format that uses disk space efficiently *and* is supported by the desktop publishing program and any other software with which you plan to use the images. Letraset's RIFF format is efficient and supported by QuarkXPress and Letraset DesignStudio. Aldus PageMaker supports several varieties of TIFF format, including ones saved with *LZW* and *RLE encoding.* These schemes save space by replacing groups of identical values with codes that represent all of them.

But matching file formats is one of the easier aspects of electronic imaging. As this column and last month's have shown, getting good results from a scanner and image processing program isn't a point-and-click proposition, contrary to the rosy claims of some imaging-product vendors. Before taking the image processing plunge, assess your goals. If you want high-quality halftones in desktop publications, you might be better off using conventional photographic halftones, which are inexpensive and generally superior to digital halftones. Many publishers (including *Macworld*) are committed to pushing the technology and adopting all-electronic publishing techniques, but with that commitment come myriad technical and logistic hurdles. If conventional techniques are working for you now, take a slow and steady approach to going electronic. The problem with pushing technology is that it often pushes back, and often when you're on deadline. M

See Where to Buy *for contact information.*

Contributing editor Jim Heid focuses on a different aspect of Mac fundamentals each month. His latest book, Macworld Complete Mac Handbook *(IDG Books Worldwide, 1991), is an updated collection of more than 40* Getting Started *columns.*

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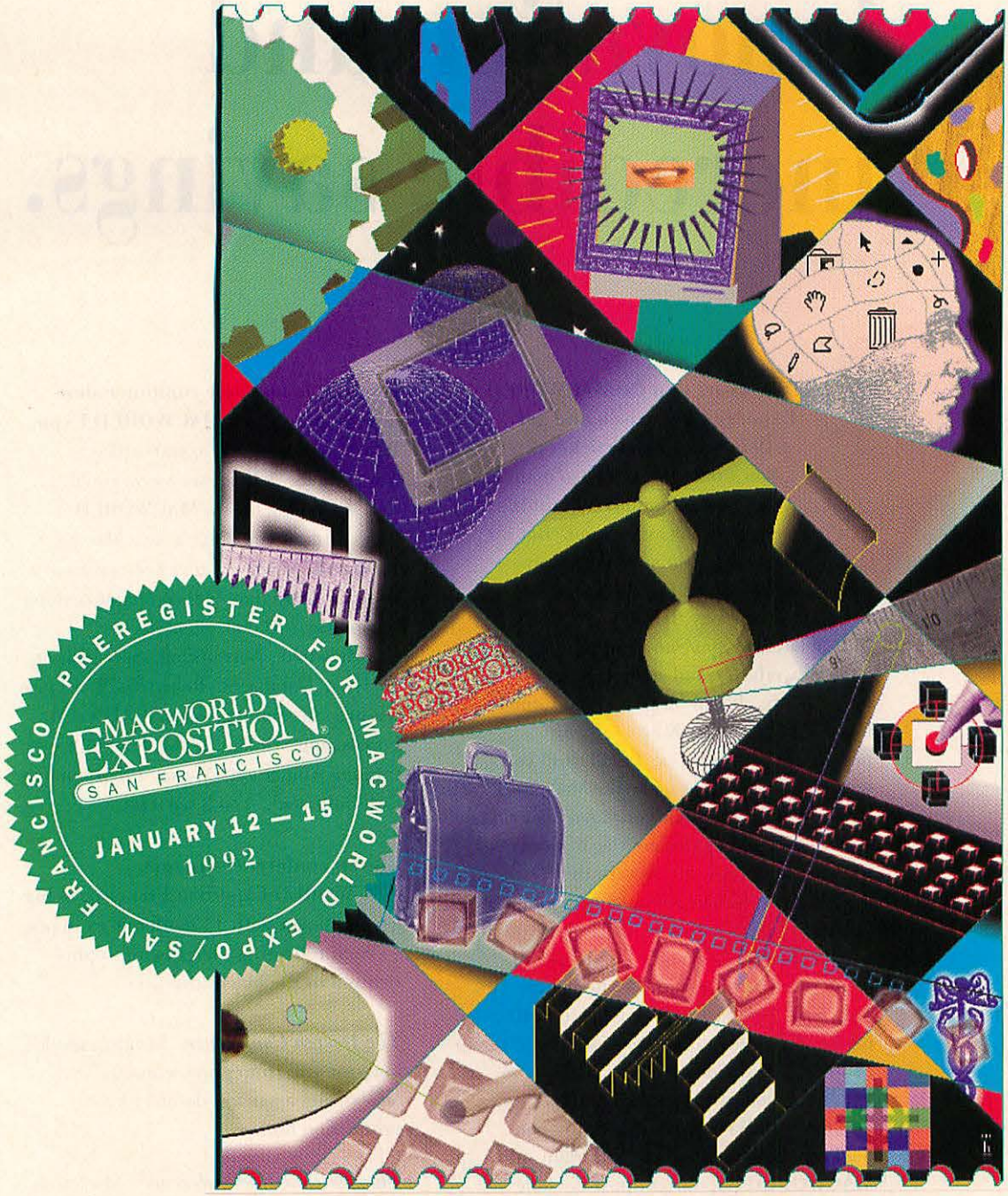
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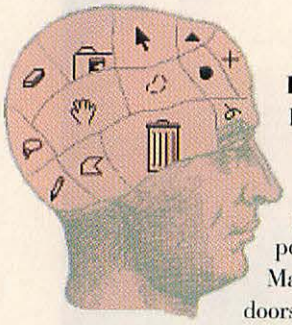
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(No conferences held)

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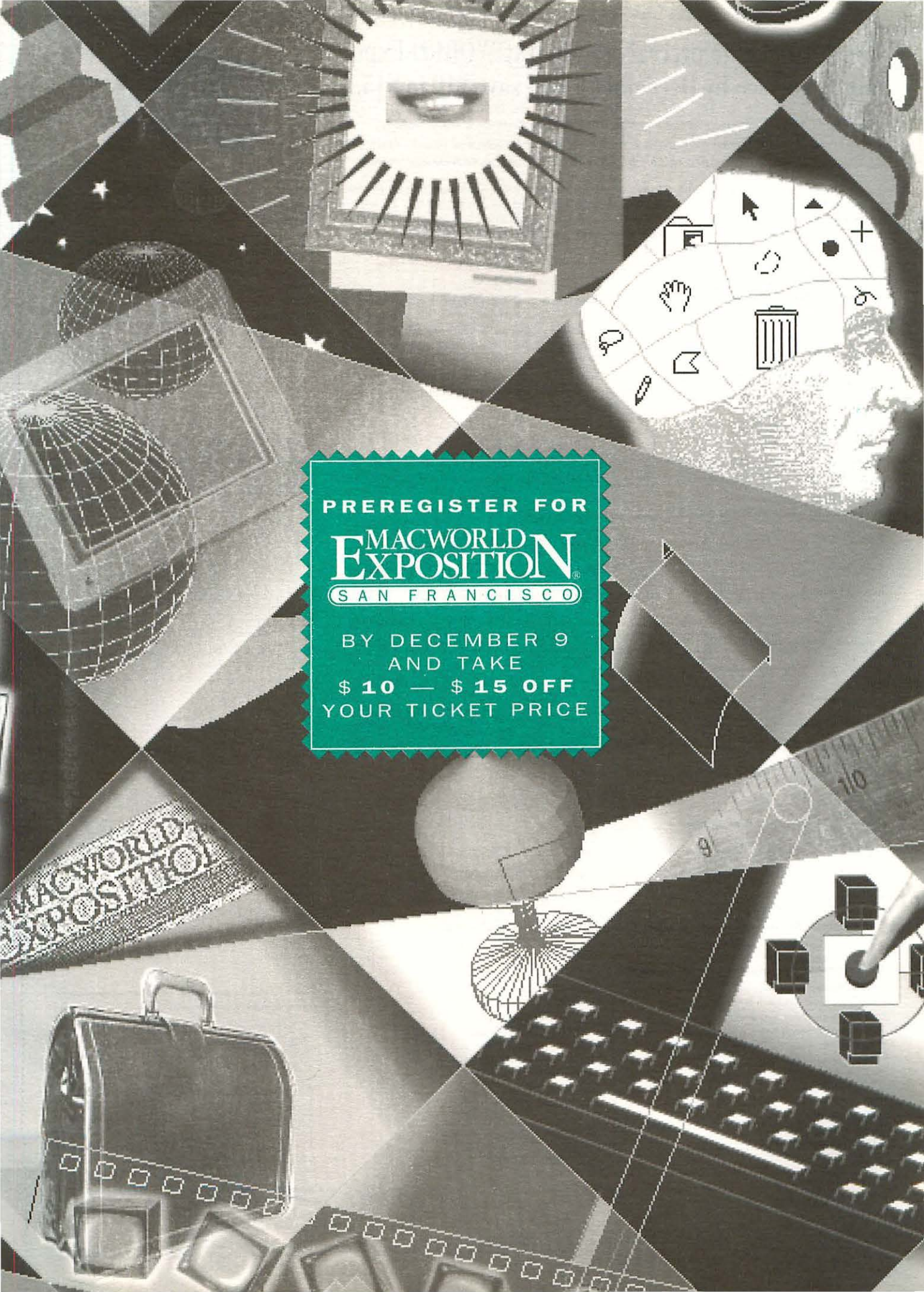
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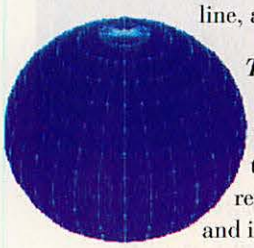


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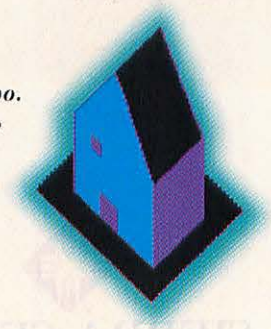
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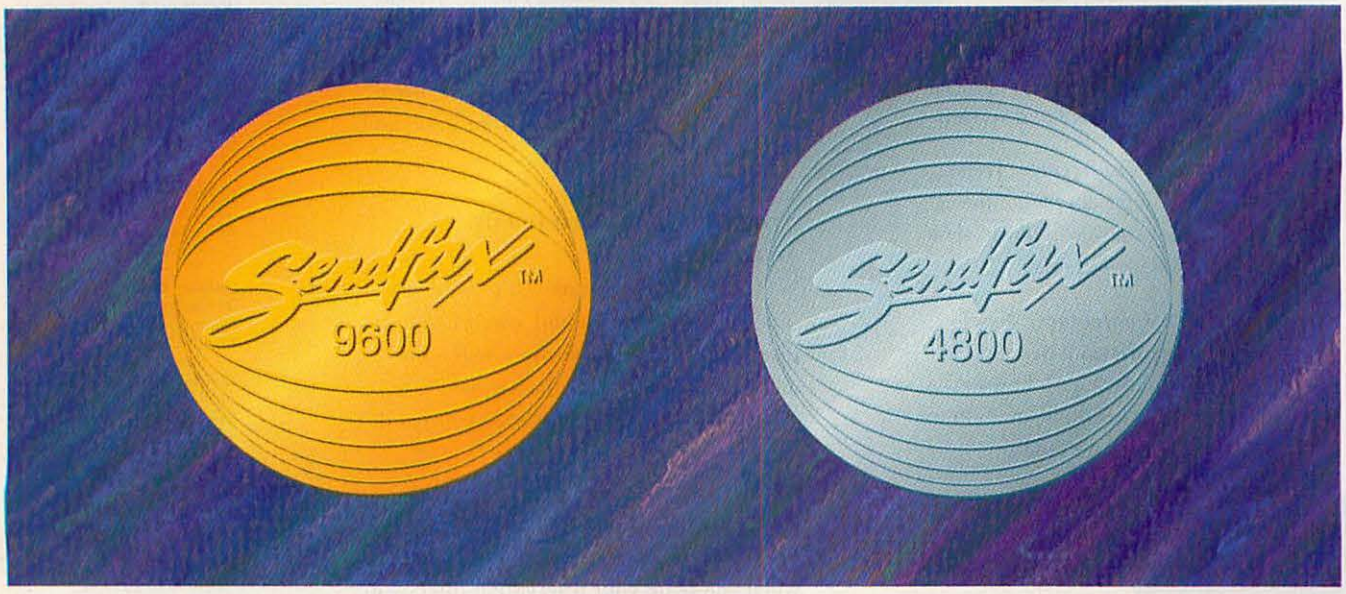
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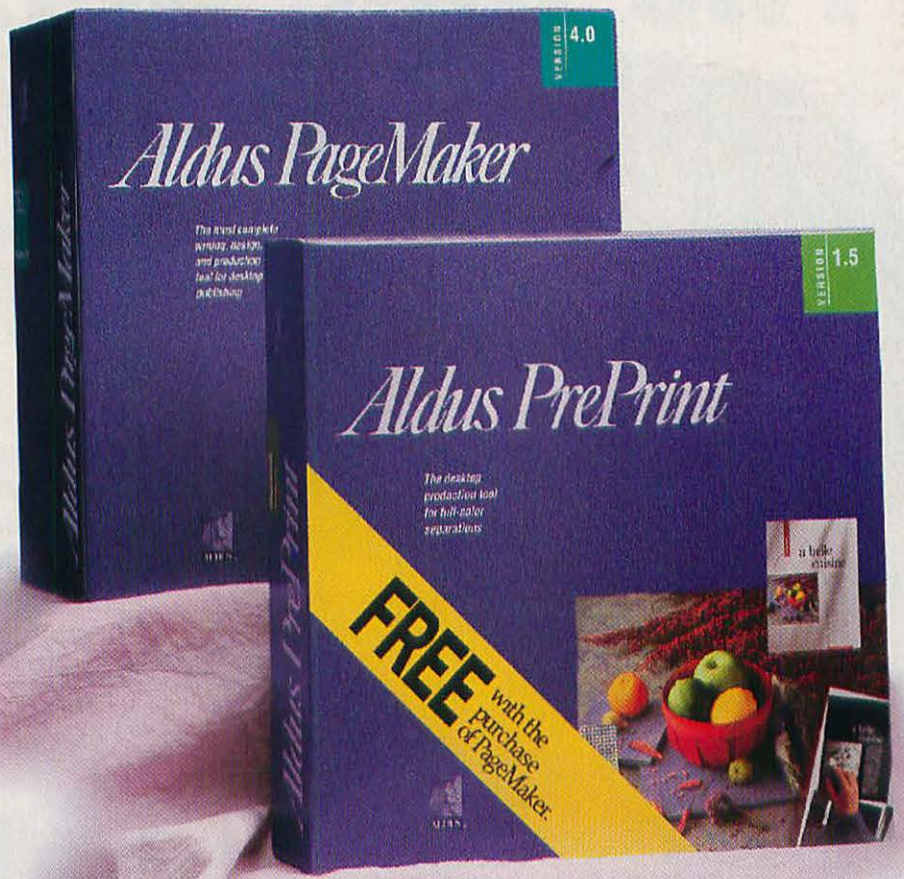
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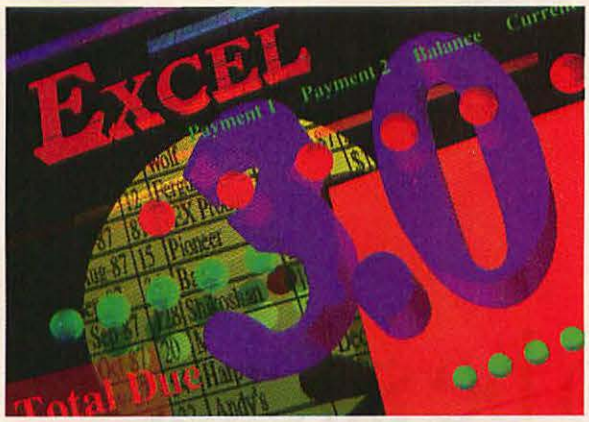
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Insights on Excel 3.0

TIPS AND TECHNIQUES FOR THE NUMBER-ONE SPREADSHEET

BY CHARLES SEITER

Microsoft Excel has dominated the Macintosh spreadsheet market from the beginning, but competitors with new features, both flashy and useful, began to chip away at Excel's monolithic market share by 1990. Microsoft has finally brought out a release that includes the most important features found in Wingz, Full Impact, and Resolve. I would like to thank Microsoft's Karen Meredith and the Microsoft technical-support staff for their invaluable help.



MARK JASIN

Quick Start

When you are working on a project extending over several days, you may want to have an Excel document open automatically when you open Excel. In 3.0, the default start-up folder is simply called the Excel Startup Folder and is automatically installed in the System Folder during setup. Any files that are placed in the start-up folder and that Excel can open will open automatically at start-up. This includes worksheets, macro sheets, charts, work-space files, add-ins, and custom applications. Template files, however, are an exception. Template files placed in the Excel start-up folder do not open automatically but are listed in the dialog box when you choose New under the File menu.

Charting Tools

As you must have discovered by now, you can open a chart window on an Excel worksheet by selecting a data range, clicking on the tool bar's chart icon, and then click-dragging a chart area. This gives you a chart floating in its own graphics layer above the worksheet, but the top of the screen still shows the worksheet menu bar. To get the chart into a chart window and to show its associated menus for formatting tasks, double-click on the chart. When you have finished changing format or adding a legend, close the chart window, and the chart object in the graphics layer is updated to reflect the changes. Double-click on the chart anytime to make more modifications.

Sanity Check: Editing

If you have been driven insane by Excel's leaping to an adjacent cell when you try to move around in a cell with the arrow keys while editing, take heart. The active formula bar in Excel 3.0 has two modes: Edit and Enter. When the formula bar is in Enter mode, the arrow keys move the selection rectangle from one cell to another. In Edit mode, the arrow keys move the cursor fom character to character within the formula bar. When you activate the formula bar, you are automatically in Enter mode. You can switch back and forth between Edit and Enter modes using the ⌘-U toggle.

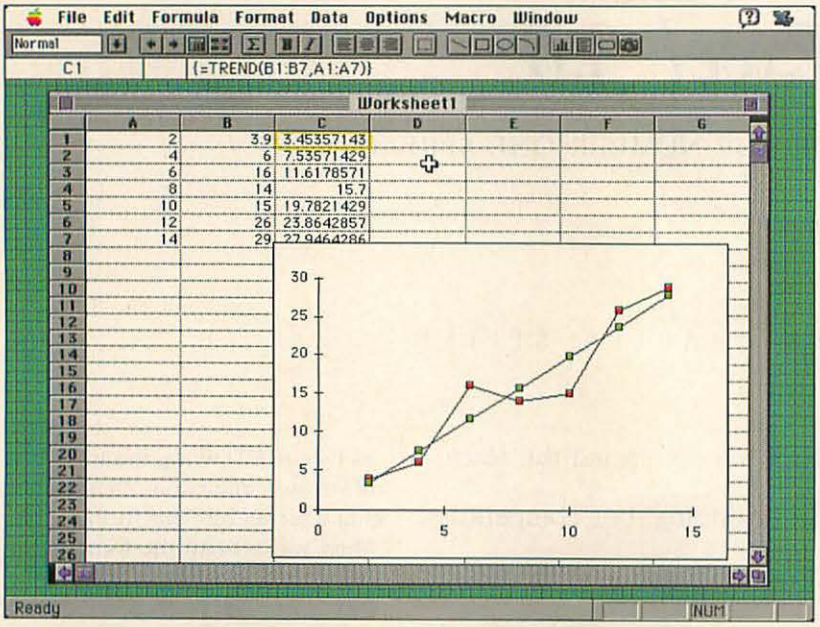
Another editing point: to enter a carriage return in a cell and force the text to wrap, hold down the ⌘ and option keys while pressing the return key. You can also get more than one line in a chart label by holding down ⌘ and pressing the return key.

Science Class

Excel has always been satisfactory for business-type charts. Now 3.0 makes it possible to do some tricks associated with scientific applications too.

- *XY Charts* To create a simple XY chart, select the columns of data to be plotted. Column headings can be included if all columns have them. (Note: this won't work if the columns contain other nonnumeric data.) Open a new chart in the usual way, from the File menu. You'll see a dialog box, in which you can check the third option, X-values for XY-chart, thus bypassing the confusing Excel nomenclature about categories.
- *XY Plus* There's not much point in drawing a connect-the-dots version of an XY chart. In Excel 3.0 you can create a chart that also shows regression

(continues)



THE STRAIGHT GOODS **Using the TREND function and Excel's new facility for making XY charts, you can plot a regression line along with your data.**

lines. The TREND function generates an array of values representing the best-fit straight line through a set of selected values. Once you have created a column of x values and a corresponding column of y values, just select a blank column range next to them, paste in the function TREND, use the mouse to select the "known X" and "known Y" argument ranges the function requires, press ⌘-enter, and Excel enters the set of best-fit y values into the column range you selected. Select the x, y, and computed best-fit y values for XY charting, and you will see a plot in which one set of symbols is clearly the regression line (see "The Straight Goods").

Note that by providing the ability to display regression lines (the Excel Function Reference explains how to do nonlinear regression, too) and select single items from complex multiseries charts (hold down the ⌘ key and click on a point in a chart to select it), Excel offers the most frequently used functions of popular statistics programs.

Macro Debugging

Debugging a macro without rewriting it from scratch can present a small problem—opening the macro to edit

How to be social.

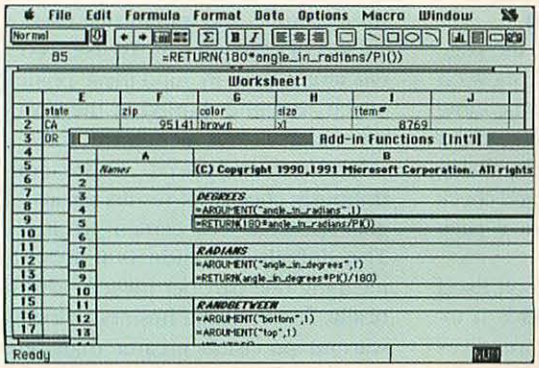
Think how much more effective your people would be if they could communicate better. That's the idea behind WordPerfect Office™ 3.0 for the Macintosh.

It's actually several programs in one. WordPerfect Office comes with a very versatile E-mail package (WordPerfect Office Mail™), that makes it easy for people on a Macintosh network to keep in touch. The mail screen shows you everything you need to compose and circulate messages to an individual, to a group, or to the entire corporation.

With Mail, not only can you send and receive messages, but you can also attach up to 100 files of any format. Beyond that, you can add sound or voice annotation, broadcast a message to anyone logged onto your network, or send carbon and blind copies.

Ever wish you could take back your words? Mail's unique status tracking capabilities let you know when a message has been delivered or opened. So if a message hasn't been read yet, you can retract and edit it.





MACRO VIEW **Excel normally hides add-in macros. To get a look at a macro for debugging, find the macro in the Open dialog box, select it, hold down the shift key and click on Open, and then choose Unhide from the Window menu.**

it. If you simply double-click on an Excel macro, the application launches but the macro doesn't open; and if you select the macro and choose Open from the File menu, nothing happens.

To open an add-in macro or template, select Open in Excel's File menu, find the macro in the file list, and select it. Hold down the shift key, and click on the Open button. When the macro opens, it will be hidden (add-in macros are different from regular macros in that they always open hidden, regardless of how they were saved). To view the macro, select Unhide from Excel's Window menu, and choose the macro (see "Macro View").

Overload

When you try to open more than about 32 Excel files, you get the error message "Can't open or save more documents." If you open a few spreadsheets and start making charts in each one, you can hit this limit fairly easily, as each chart is a new document. At start-up the System sets the maximum number of saved files an application may have open at any time. The error message means that the System will not allow Excel to open any more saved files, nor save any changes in currently open files (that's the sticky point). You can still create additional new documents in Excel by selecting New from the File menu, but it's a dangerous practice, since you won't be able to save these files until you close some of the files that are currently open. Keep checking the Window menu, which lists all active windows, to make sure you're not running close to the limit.

▪ *Data Form* If you create a database in Microsoft Excel that contains many fields, the Data Form extends off the screen. The default Data Form, which appears as a dialog box, always lists the fields in your database from top to bottom, with each field as wide as the widest column in the database. To make a Data Form containing a large number of fields and/or wide fields and to get as much information available to fit on the screen, you need to create a custom Data Form.

(continues)

How to get a date.

Of course, open communication is only one of many ways to bring people together. That's why WordPerfect Office 3.0 for the Macintosh also offers an integrated calendar and network scheduler to help you make appointments, coordinate meetings, schedule events and company resources as well as make to-do lists.

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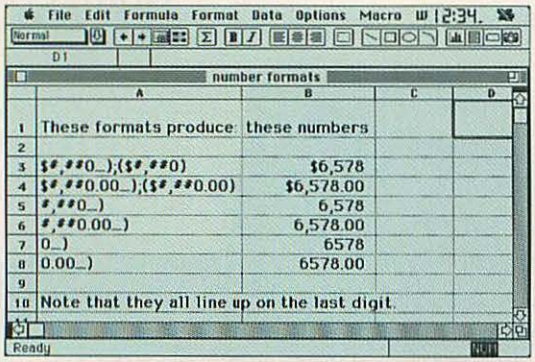
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To create a custom Data Form you simply use the Dialog Editor to make a custom dialog box. Static text may be used in the Dialog Editor to enter labels for the Data Form, and text-edit boxes should be used to refer to fields. Enter the database field names in the initial/result field of each text-edit item to identify the database field that relates to that edit box. Then copy the dialog box from the Dialog Editor, paste the dialog into the worksheet, and name the dialog "data_form". When you select Form from the Data menu, Microsoft Excel displays the first record of your database in the custom form.

Linking

Excel 3.0 has enhanced linking capabilities, but the best way to use them may not be apparent at first. For example, link formulas between worksheets now behave like formulas linking cells on the same worksheet.

Often you may want to move information on a supporting worksheet without Excel updating the link formula on the dependent worksheet. One way to do this is to copy and paste rather than cut and paste—in this case the dependent formula reference does not change, and the original supporting cell(s) can then be cleared of the copied data. A more foolproof method is to use the INDIRECT function in the dependent formula. For example, if in cell A1 of Sheet1 (dependent) you have entered =Sheet2!$A$1, this could be replaced by =INDIRECT("Sheet2!$A$1",TRUE). This reference will not change even if you insert, delete, or move the data in Sheet2!A1 (supporting).



THE LINEUP The use of _) in formatting numbers gets the last digits to line up in a mix of plain numbers and currency numbers. Note that the first two entries are standard and the others are custom.

Little Notes on Formatting

- *Page Breaks* In Excel 3.0, the page breaks inserted by Excel don't show on screen by default. They work the same way they always did, but to see them you have to go into the Display dialog box under the Options menu and check Automatic Page Breaks. Manual page breaks are always displayed.
- *Number Lineup* In Microsoft Excel 3.0, the underscore character (_) indicates a placeholder that reserves space in a number format. Excel reserves enough space for the character following the underscore. For example, 0.00_) leaves as much space to the right of the second digit after the decimal as a right parenthesis would occupy. You can use this to make currency and non-currency numbers line up neatly in a report—just place an underscore and a parenthesis at the right end of the number format. This can be accomplished using the edit box within the Format menu's Number dialog. (See "The Lineup" for an illustration of formats.)
- *Text Lineup* If you have a table with multiple-line cells, the data in the single-line cells in that same row, by default, align at the bottom of the multiline cell. To fix this, check Wrap Text for the single-line cells in the Alignment dialog box under Format.
- *Fractions* In earlier versions of Excel, if you type 1/2, the program thinks you mean January 2, not a fraction. In version 3.0 there is a way around that. To get Excel to accept 1/2 as a fraction, you must type a 0 (zero) and a space before the entry. Excel treats such entries as text if the numerator is 13 or greater and/or the denominator is 100 or greater. Here are some samples:

Typed	Interpreted
1/2	January 2 of the current year
0 1/2	1/2 or 0.5
14/7	The text string 14/7
0 14/7	2 (two)

Solver Solutions

Microsoft does a good job of explaining how to use Solver to maximize or minimize functions in business, and most users will probably find maximizing profits and minimizing costs a subject of keen interest. To use Solver efficiently, keep in mind these points, which are either buried in the documentation or not mentioned at all.

- *Numbers and Speed* Solver continuously checks its results against a goal specified to a certain precision. The default precision is 0.000001, meaning one part per million. Realistically, few available business models warrant precision greater than one part per thousand—few would, for example, have a function that relates its sales to revenues and that is accurate to one tenth of a percent. For business purposes, set Precision in the Solver Options dialog box to 0.001 and then click on Save Model. For complex models, you can expect speed to increase by a factor of two to ten with no loss of validity.
- *Lines versus Curves* The check box for Assume Linear Model in Solver Options is another good place to enhance your model's speed. Especially for business profit-and-loss models, you may find that your model was linear anyway, consisting mainly of sums of terms and a few constants; or that you can linearize the model in the spreadsheet by making up a new variable that absorbs cross-terms or powers of another variable. The point is that for linear models Solver can use a different computational method that for most problems is an order of magnitude faster than the default method. If you don't have an engineering problem in which unavoidable nonlinearities are dictated by the laws of physics, you may find that the linearized version of your model is as realistic as a more ornate model with multiple nonlinear terms.

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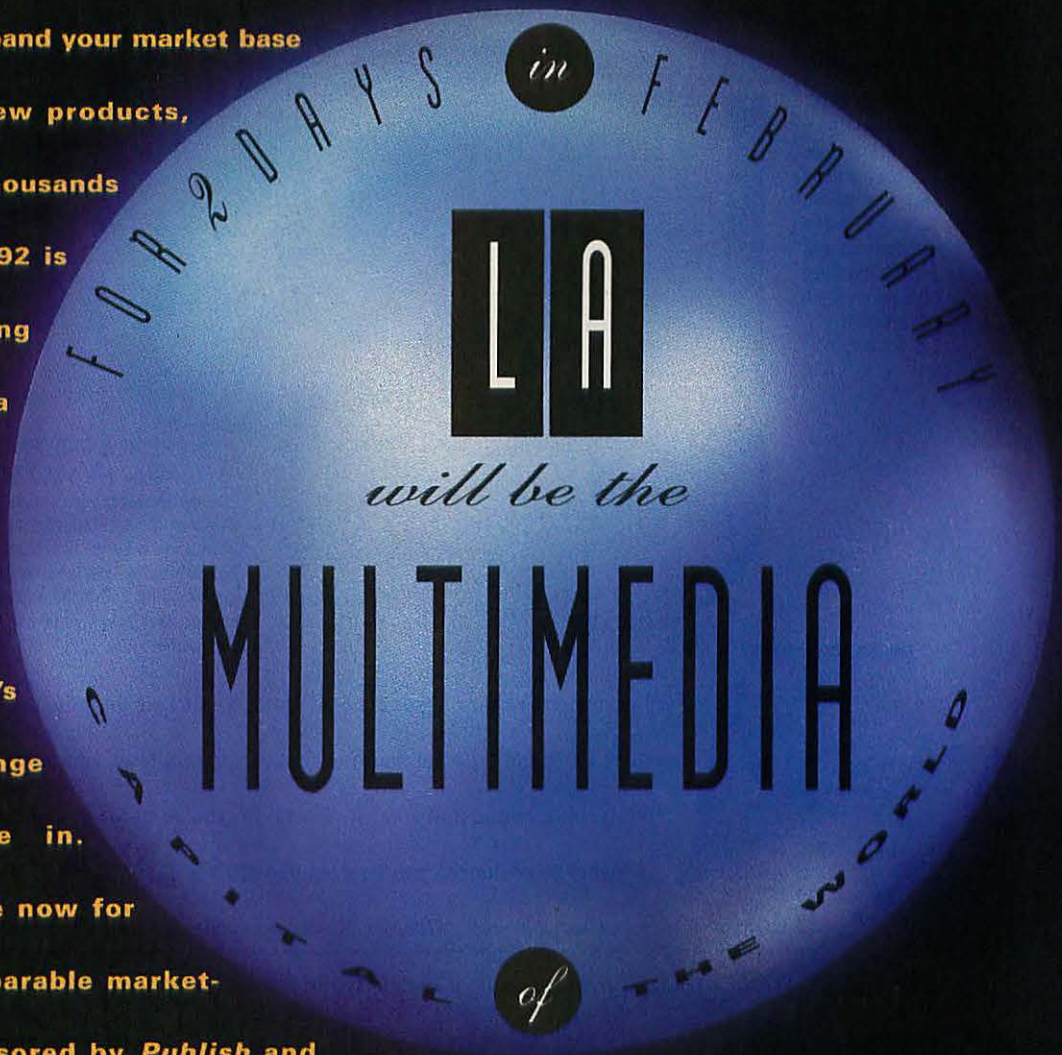
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Charles Seiter is a Macworld *contributing editor and veteran spreadsheet user who has been working with Excel 3.0 since its earliest beta phase.*

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Spaceship Warlock Reactor; 312/528-1600, 800/843-9497; fax 312/528-9562.

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TelePort/LapFax; TelePort/Lap V.32 Global Village Communication; 415/329-0700, 800/736-4821; fax 415/329-0767.

TokaMac CI, LC, SX Fusion Data Systems; 512/338-5326; fax 512/338-1276.

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WordPerfect Office 3.01 for Macintosh WordPerfect Corp.; 801/225-5000, 800/321-4566; fax 801/222-5077. M

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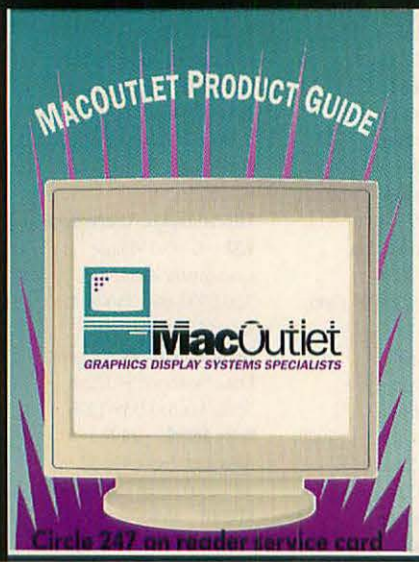
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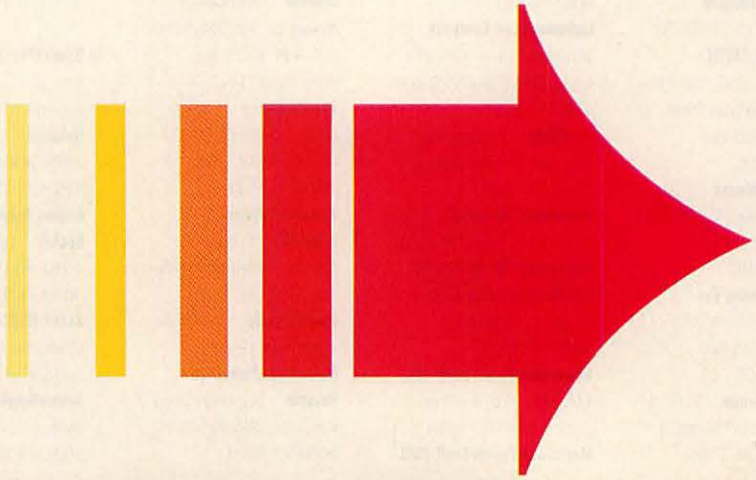
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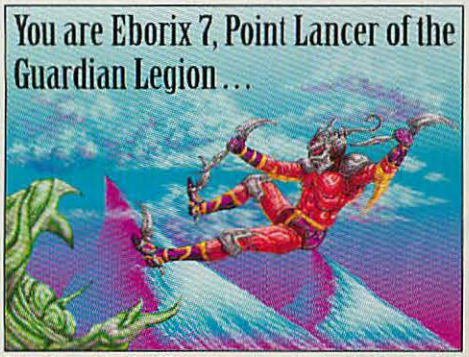
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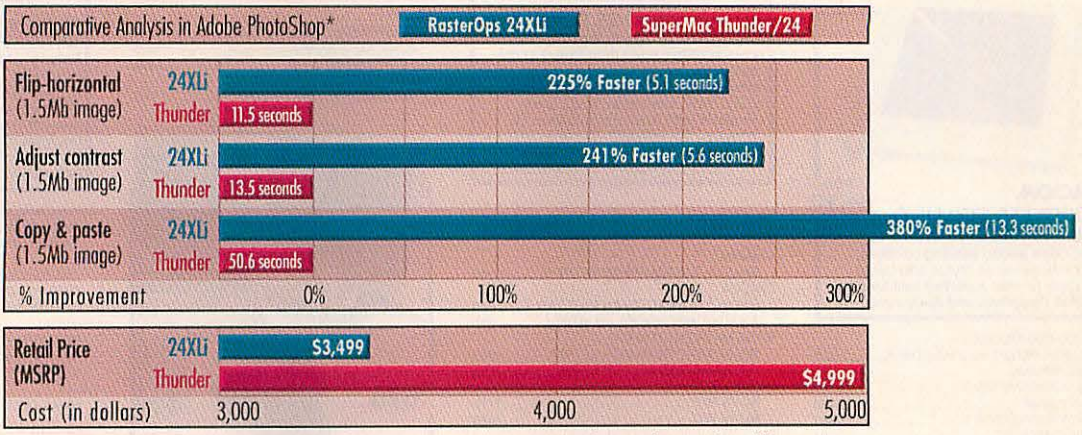
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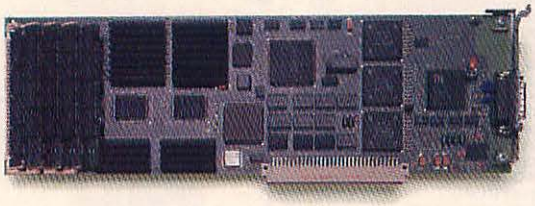
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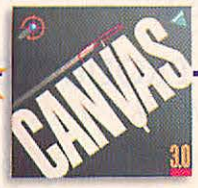
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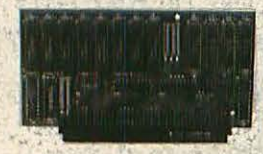
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Faster than Apple's NuBus adaptor—runs at 20MHz.



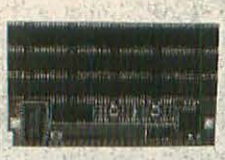
IIsi 20MHz FPU—$75

(Requires slot adaptor.)



IIci 64K Cache Card $159

40% performance increase. Industry standard 64K!



8 & 16Mb SIMMs

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64K Cache. 68882. '030 Slot Adaptor.
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LogiCache IIsi 64K	$169
IIsi 030 Dual Slot Adaptor	59
20 MHz 68882 FPU	75

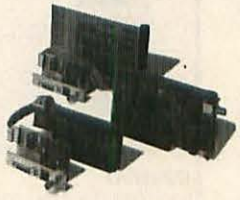
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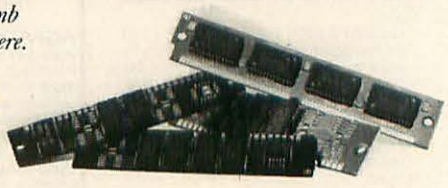
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**Remove drive from IIsi and LC, install in Classic.*





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Austin, Texas 78758

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Circle 156 on reader service card

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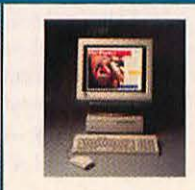
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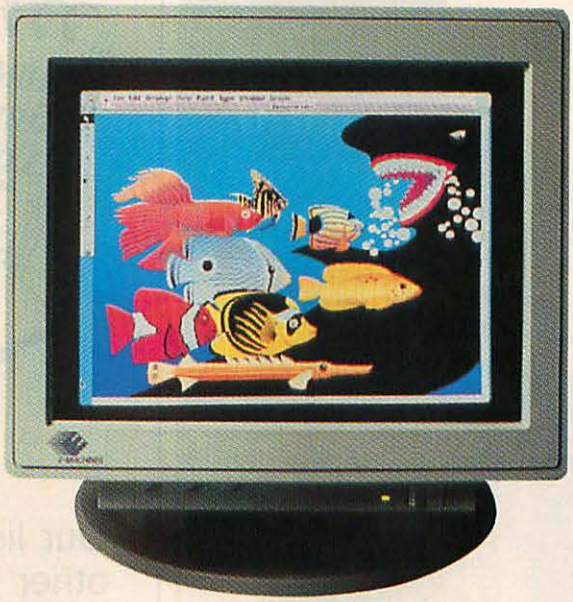
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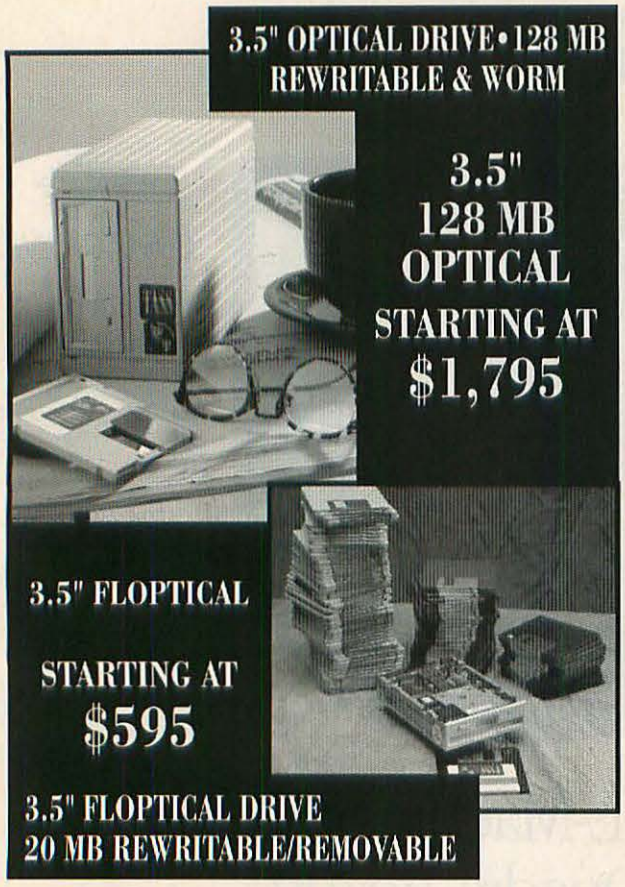
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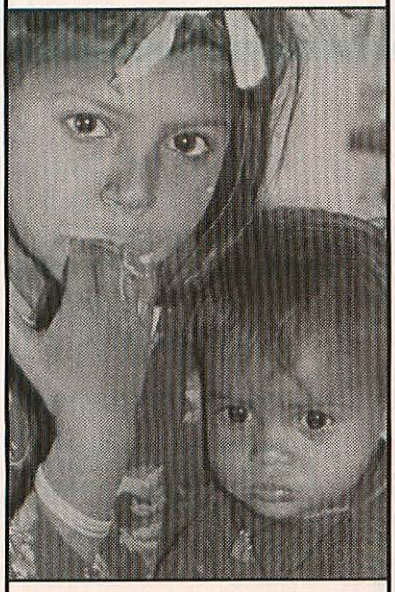
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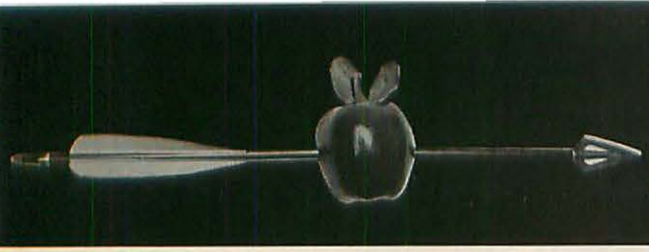
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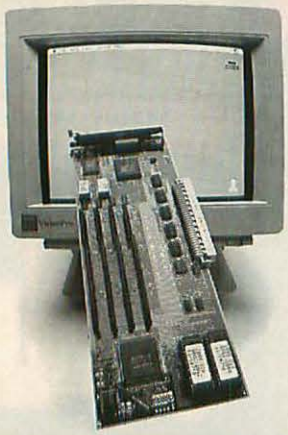
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- 24-bit SP card, 20" Triniton $3349

SystemPRO Sony

- 8-bit SPS card, 19" Sony Triniton (GDM-1950) $3544
- 24-bit SPS card, 19" Sony Triniton (GDM-1950)... .....$3997
- Apple 13" RGB.....$749
- Hitachi 14" MVX Super (Hi-res w/ tilt & swivel) $575

Video Interface Cards

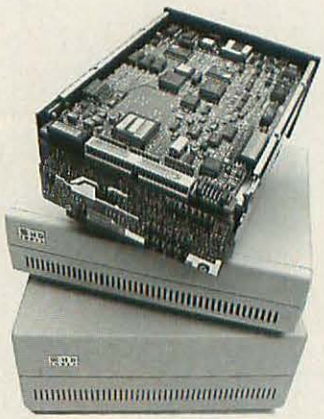
- 8-bit VisionST 813 (for Apple 13" or 14" color) $275
- 24-bit VisionST 2413 (for Apple 13" or 14" color) $375



COLOR SCANNER

- VisionPro C600, 600 dpi w/ ***Adobe Photoshop***.....$1199





STORAGE SOLUTIONS

MacTel offers you a number of storage and backup solutions, including a complete line of Index hard drives. Three of our drives have been rated 4 mice by *MacUser* Labs: the MacTel 45R drive (2/91), the Index 1.2 Gb drive (7/91) and the MacTel 2 GB DAT drive (10/91).

The Index HD formatter is System 7 compatible and supports partitioning, password protection and is A/UX compatible.

REMOVABLE - OPTICAL - TAPE

- **Index 45R w/1 cartridge** $479
- Index 88R w/1 cartridge.....$899
  Index 45R and 88R are bundled with ***Backmatic***® and ***AutoSave***®
- SyQuest cartridge SQ 400.....$69
- SyQuest cartridge SQ 800.....$149
- **2 GB DAT drive w/*Retrospect* software and 1 tape** **$1499**

NEW

- DAT drive cleaning kit.....$19

NEW

- 1 GB Tahiti optical drive w/1 cartridge.....$3699

Index and VisionPro are registered trademarks of MacTel Technology.

INDEX HARD DRIVES

Quantum drives Index 3.5"

	Internal	External
• 52 Mb, 12 ms, Slimline	$249	$329
• 105 Mb, 12 ms, Slimline	$369	$449
• 210 Mb, 12 ms	$699	$779
• 425 Mb, 12 ms	$1449	$1529

Imprimis drives Index 5.25"

• 320 Mb, 16ms	$1179*	$1279
• 330 Mb, 10.7 ms (Runner)	$1299*	$1399
• 640 Mb, 16 ms	$1459*	$1559
• 650 Mb, 10.7 ms (Runner)	$1849*	$1949
• **1.2 Gb, 16 ms**	$2199*	$2299

*Mac II and IIx only

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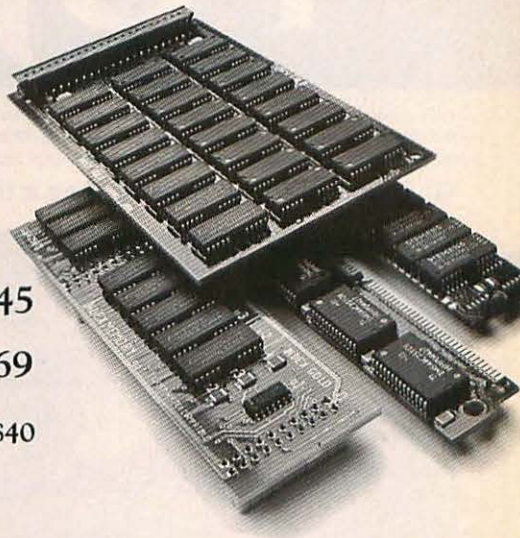
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INDEX MEMORY MODULES

GO FOR THE GOLD.

MacTel manufactures and tests our memory modules in-house to ensure the highest possible quality and reliability. All our SIMMs use ***gold traces and contacts*** for greater conductivity and durability. Our field test failure is *less than 1%*! In fact, we have so much confidence in our memory products that we back them with a lifetime warranty.

- 1 Mb surface mounted/ low profile, 70/80 ns $37.95
- 1 Mb fx & LaserWriter II NTX SIMM, 70/80 ns $38.95
- 1 Mb x 9 SIMM, 70/80 ns $43
- 3 Mb Classic memory $99
- Mac LC V-RAM upgrade $69
- 4 Mb surface mounted SIMM, 80 ns, (IIcx, IIci, IIfx, IIsi and LC) $145
- 1 Mb TI microLaser PS 17/35 & XL upgrade $69
- ***Maxima*** virtual memory managment software $40



KEYBOARDS

MacTel's Index line of ADB extended keyboards have a 105-key layout, 15 function keys, cursor control keys and number pad. The French, German and Swiss keyboards come with system software.

Index extended keyboard

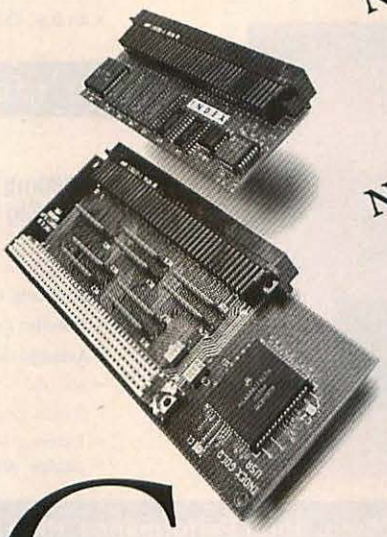
- English $99
- French, German, Swiss $119

NEW

- Spanish $119



ACCELERATOR BOARDS



NEW

On-board 68882/20 MHz math co-processor with adaptor for Macintosh IIsi. ***Benchmark*** software included.

- **Index Mac IIsi 030 Direct Slot Interface** **$99.00**

NEW

Accelerate math-intensive operations on your LC operations by up to 39% with a 68882/16 MHz math co-processor —and get a 15% overall CPU improvement. ***Benchmark*** software included.

- **Index LC Mathmate** **$99.00**

Increase the speed of your Mac IIci up to 33% with MacTel's new CachePro card—offered at an amazingly low introductory price! Easy to install and DA controlled.

- **Index CachePro / Mac IIci** **$119.00**

MACINTOSH CPUS AND SYSTEMS

- Mac LC ..... $Call
- Mac IIsi ..... $Call
- Mac IIci ..... $Call
- Mac IIfx ..... $Call

Contact the professionals at MacTel now for additional information. We handle only the best in Macintosh hardware, systems and peripherals, with names like Apple, Nikon, RasterOps, Wacom, Sharp and our own top-quality VisionPro and Index brands. Call or fax for a free catalog.

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- 200,000 Hours MTBF
- 9ms access time!
- Incredibly Fast & Reliable!
- Perfect Internal for all Macs!*

Fujitsu is the second largest computer company in the world. With 20 Billion dollars in revenues (10% of which goes into research and development), Fujitsu is the IBM of Japan. We have sold thousands of Fujitsu drives and have found there quality and performance second to none. Quality like Mean Time Between Failures of 200,000 hours (22 YEARS!) and speeds of 9ms put them at the head of the storage pack..

Give one of these great drives a thirty day test drive, if you don't like it send it back for a full refund.



FUJITSU 3.5" 520, 425, 330mb... State of the art performance

	Internal	External
330 MB 3.5" Half Hght 9ms	$1298	$1398
425 MB 3.5" HalfHght 9m	$1448	$1548
520 MB 3.5" Half Hght 9ms	$1548	$1648

- Incredibly fast! These drives are the quickest 3.5" we have tested
  - 4,400 RPM Rotational speed
  - 5 MB/s Data transfer rate (sync)
  - 256K Data buffer for incredible throughput speeds!
  - 9ms effective access time, 3ms track to track access
- 5 year warranty! 200,000 Hours Mean Time Between Failure! (That is 22.89 years of continuous 24 hour usage!)
- Support A/UX, System 7
- All 3.5" External cabinets include a 40 watt power supply,



FUJITSU 1.2 Gig, 680mb...High performance, High Capacity

	Internal	External
680mb Hard Drive	$1348	$1448
1.2Gig Hard Drive	$2098	$2198

- MacWorlds Fastest 1.2 Gig drive (July 1991)
- Supports A/UX and System 7
- Transfer rate 4.8 Sync, 2.0 assync
- Average access time of 11.5 (1 Gig)
- 200,000 hours Mean Time Between Failure, (Thats 22 years of 24 hour a day operation!)
- External 5.25" Drives incl. 65 w. power supply, cables, and ext. terminators

FUJITSU 45, 90, 135, and 185mb...High Performance, High Reliability and Great Prices!

		Internal	External
45 mb	3.5" Low Profile/Low Power3yr warr, 50,000MTBF	$198	$248
90 mb	3.5"3yr warr, 50,000 MTBF	$298	$368
135 mb	3.5"3yr warr, 50,000 MTBF	$378	$448
185 mb	3.5"3yr warr, 50,000 MTBF	$498	$568

- Incredibly reliable! Less than .0006% returned on the 45mb!
- Support A/UX, System 7,
- Transfer rates up to 1.8mbs Sync
- Average access times of 14ms
- 50,000 hours Mean Time Between Failure, (Thats 5.7 years of 24hour a day operation!)
- Three year warranty



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NEC MacSync 14" Color
Direct into SI, CI.....$438



- All 3.5" Drives are available in zero footprint (including a 40watt power supply, and dual AC outlets), or micro cabinets as well as internal for all Mac's.
- All 5.25" Drives are available in zero footprint external (including a 65 watt power supply, cables, and ext. terminators) or as internals for the Mac II, IIx, and IIfx.

Introducing Hitachi 3.5" & 5.25" Drives

	Internal	External
425MB 3.5" 5 year warr., 150,000 MTBf* 13ms Access.....	$1398	$1498
1.6 Gig 5.25" 5 year warr., 150,000 MTBf* 12ms Access.....	$2798	$2898

* Mean Time Between Failure is the average life expectancy of a drive.(In case of a 200,000 MBTF, this means a potential of **24 years** of 40 hour weeks, 52 weeks per year!)

Quantum 3.5" & Wren 5.25 Drives

	Internal	External
Q 52MB 3.5" LPS	$248	$338
Q 105MB 3.5"LPS	$368	$448
Q 120MB 3.5"	$578	$668
Q 170MB 3.5"	$598	$688
Q 210MB 3.5"	$688	$748
Wren 337 MB RUNNER	$1398	$1498
Wren 600MB F/H	$1598	$1698
Wren 630MB RUNNER II	$1998	$2098
Wren 1.2 Gig	$2298	$2398

Archive DAT Tape Backup

WangDAT 1.2 Gig Capability.....$1498
ArDAT 2.2 Gig Capability.....$1498

- Up to 10 mb per minute backup time
- Includes SoftBackup II for Fast network and unattended backup capabilities

SyQuest! 44MB & 88MB Removables

44MB REMOVABLE.....$448.00
88MB REMOVABLE.....$648.00

- 19ms Access time
- Both Drives include Cartridge
- 40Watt power supply
- SCSI Select and 2 Year Warranty



Ricoh Optical

600 MB Optical.....$1998

- Read/write reliable storage
- 66ms Access Time
- Great for archiving, color scans etc.

Introducing CD ROM Toshiba & Chinon

	External
Toshiba 3301	$568

- Includes Driver, CD carrier and cables
- 325ms access time, 2 year warranty

Chinon CDC-431 (Includes Audio Remote Control) $598

- Includes Driver, CD carrier and cables
- 350ms access time, 1 year warranty
- Includes 12 function audio remote control, usable even with your Mac off!



JX-9500PS Sharp Printer 35 Fonts

JX-9500PS 35Fonts.....$1598.00

- 2.5 mb Ram Memory
- Adobe Postscript
- MacUser #1 printer 4.5 mice rating
- 35 Fonts, 6 page per minute
- Letter, legal and transperancies
- Includes Appletalk interface!
- Sharp is the manufacturer of the TI Microlaser, this is the same printer, but with 2.5mb!

800 K Mac Floppy Drive $99

These Fujitsu External floppy drives have a one year warranty. Completely compatible.
These are brand new slimline drives and they look great!
These drives retail for $259!

Fujitsu 800k 99.00!



14" Color for 388.00!

Introducing 14" Monitors!

14" GoldStar Color System.....$388
*3 year warranty on tube!

14" NEC Color System.....$438

14" Sony Trinitron Color.....$668

The GoldStar and Sony monitors are plug compatible with the Mac LC, IIsi, and CI. The NEC monitor is plug compatible with the Mac IIsi, and CI.

19" & 20" Monitors!

20" Phillips Color System 75hz
256 colors With RasterOps8 Bit card.....$1598
16 Million colors w/Nat'l. Semi 24 Bit card.....$2398

19" Trinitron Color System 75hz
Ikegami CT-20 .....w/8 Bit Card.....$2398
16 Million colors w/Nat'l. Semi 24 Bit card....$3098

19" Ikegami Grey scale and Mono
Mono.....$798
Grey Scale.....$1098
All above monitor systems include interface board and cable.



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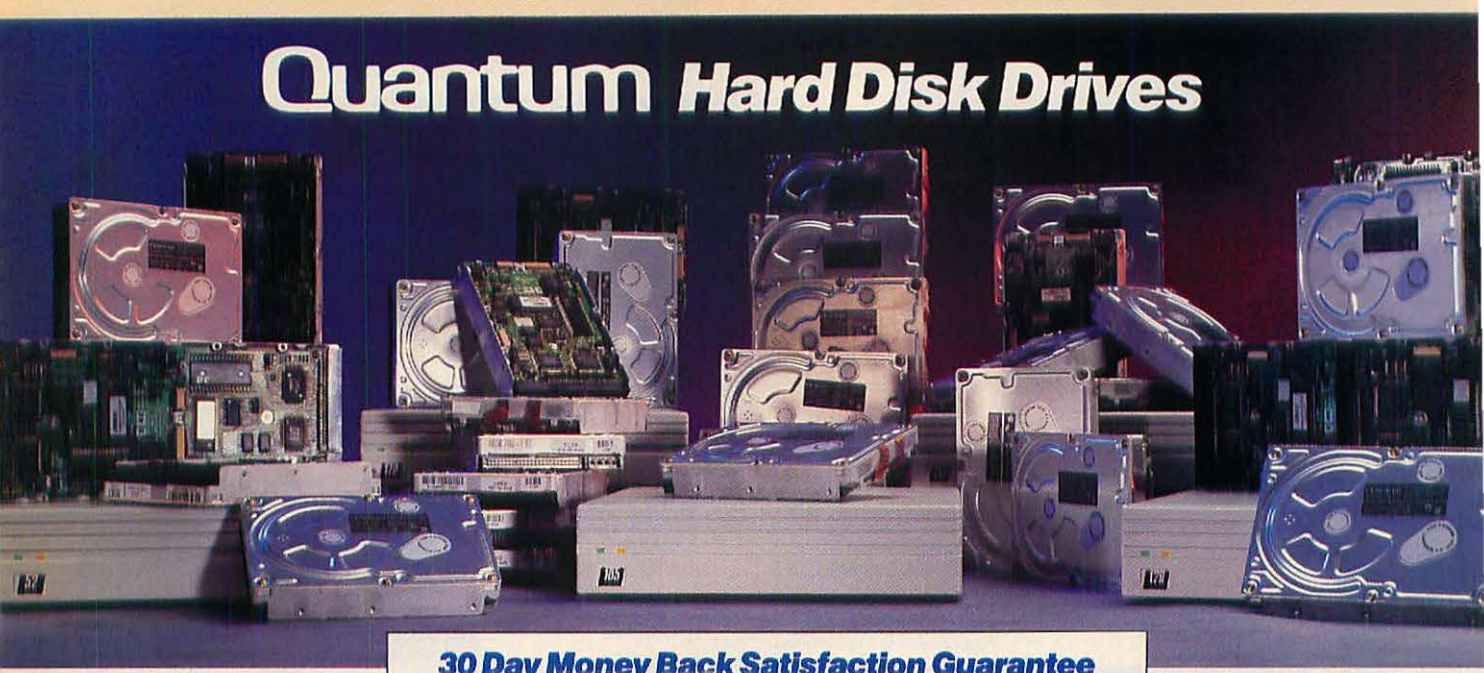
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105MB	$339	425MB	$1369	105MB	$389	425MB	$1439



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NEW!

DUAL 44mb Removable	$799*
DUAL 88mb Removable	$1199*
44mb Removable	$399*
88mb Removable	$599*

*Cartridge Not Included



44 Megabyte Cartridges

Single Cartridge	$66
Five Pak-Each	$64
Ten Pak-Each	$62

88 Megabyte Cartridges

Single Cartridge	$109
Five Pak-Each	$105
Ten Pak-Each	$99

30 Day Money Back Satisfaction Guarantee on all Hard Disk Drives!

Printers



HEWLETT PACKARD

Deskwriter	$499
Color Deskwriter C	$769

NEC

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Magic 88R $599
88MB SyQuest Mechanism

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"The low price leaders are the MagicTape 60 and MagicTape 150, from MacProducts." - MacWorld

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MagicTape 1.3 "The winner in the DAT (1.3GB) category" - MacWorld

Since 1985 MacProducts USA has been providing software and peripherals to the Macintosh community. In fact, no single company has been shipping Macintosh hard drives longer than MacProducts USA. Backed by a two year warranty and the MacProducts 30 day money back guarantee, MagicDrives are the safest bet in the business. As if that wasn't enough, MacProducts USA offers an optional overnight replacement warranty on all Magic hard drives, removables, and tape backups. That's Magic.

MAGIC 128MB 3.5" REMOVABLE ERASABLE OPTICAL

Magic 128MB REO
- 35ms access time
- 9ms fast access mode
- 40watt power supply
- One Year Warranty
- Removable 3.5" disks
- Magic Reliability
- $1499

NEW! The Magic 128MB REO is a storage breakthrough from MacProducts USA. The 128MB REO has a seek time of less than 35ms and a burst mode of 9ms. Includes MagicDrive case with a 40watt power supply, SCSI cable, software, and One Year Warranty. Internals available for Mac Quadra 900 and PC users.

MAGIC 128MB REO
External Drive .....$1499.....$45

128MB OPTICAL CARTRIDGE
3.5" cartridge disk.....$99.....$3



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Mac Quadra 700 –The desktop 040		
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MACINTOSH CLASSIC		
Includes keyboard	$910	$27
MACINTOSH LC		
Includes keyboard	$1799	$54
MACINTOSH IISI		
	$2385	$72
MACINTOSH IICI		
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Drive mechanisms. 2 year warranty.		
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52MB Quantum low profile	$239	$8
105MB Quantum low profile	$369	$14
170MB Quantum	$730	$22
210 MB Quantum	$799	$24
300MB Seagate*	$1399	$45
300MB Wren Runner*	$1650	$54
600MB Seagate*	$1899	$60
600MB Wren Runner*	$2199	$69
1.2GB Seagate*	$2695	$85
External Case Kit $99 • Internal Kit $29		

*MagicDrive Extended Warranty Available $75/ year

MAGIC REMOVABLE DRIVES

Magic SyQuest 45R	$449	$14
Magic SyQuest 88R	$599	$24
SyQuest Cart 45/88	$69/$129	$2
1 GB Tahiti Maxtor	$3995	$120
600 MB Ricoh ISO	$2599	$78
600 MB Sony ISO	$3199	$96

MAGICTAPE BACKUP

Includes Retrospect. 2 year warranty.

MagicTape 150MB	$699	$21
MagicTape 525MB	$999	$30
MagicTape 1.3GB DAT	$1695	$51
MagicTape 2.0GB DAT	$1895	$57
MagicTape 2.4GB 8mm	$2895	$87
MagicTape 5.0GB 8mm	$4499	$135

CD ROM DRIVES

Magic CD ROM (Toshiba)	$529	$19
Many CD-ROM software titles available!		

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Bernoulli Removable 90	$969	$29
Pinnacle REO130 Optical	$2629	$81
PLI Infinity Turbo 88	$1149	$41
Micronet 88 Removable	$1099	$36

MAGICDRIVE ACCESSORIES

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Magic 2400/1200/300 baud modem. 100% Hayes compatible. Includes 2 year warranty.	$69	$3
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Magic 2400/9600 FaxModem 100% Hayes & Group 3 compatible Includes 2 year warranty	$149	$6
Magic 2400 V.42 Bis MNP-5 Modem 2400 V.42 bis MNP-5 Modem. Transmit data up at speeds up to 9,600 baud. Includes 2 year warranty	$149	$5
Magic 9600 V.32/V.42bis MNP-5 Modem Transmit data at speeds up to 38.4k baud. 2 year warranty	$399	$12



Magic 9600
V.32/V.42 Modem
Software & Cable
$399

Magic CPU & Printer Memory

	BUY	LEASE
1MB SIMMs 60 – 120ns	$35	$1
2MB SIMMs	$85	$2
4 & 16MB SIMMs	$149/$899	$6
MAC LC 8-bit Video RAM	$79	$3
Portable RAM 1-8 MB	Call	Call
Classic Upgrade 2MB	$49	$2
Classic Upgrade 4MB	$99	$3
GCC PLP II/S 1MB	$69	$2
GCC BLP II/IIS 2MB	$139	$5
HP 1/2/4MB	$99/$179/$239	$3
LZR 960 2/4/8MB Upgrade	Call	Call
QMS 2/4MB	$199/$359	$6
TI 1MB RAM Upgrade.	$75	$3

1 MB SIMMs from **$35**
Lifetime Guarantee

Magic Accelerators

	BUY	LEASE
RAM-disk, improved SCSI throughput. Available math coprocessor. 1 yr warranty. Available for the Plus, SE, & Classic. MagicCache IIsi, SE/30	$259	$9
MagicCache IIci	$169	$5
Magic RailGun030 16 MHz	$399	$12
Magic RailGun030 25 MHz	$699	$21
Magic RailGun030 33 MHz	$999	$30
RailGun SCSI Accelerator	$49	$2
16 MHz 68882 coprocessor	$99	$3
MagicMath LC Coprocessor	$99	$3
Accelerators/Cache Cards –ALL MODELS!		
DayStar PowerCache IIci 40MHz	$1119	$34
Radius Rocket 040	$2599	$78



Magic RailGun 030
"IIci computing power in a Plus"
–MacUser



NEW! TokaMac 040
Accelerators starting at only $2099 for the LC, SE/30, IIsi, & IIci

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Asante 10T Hub	$935	$28
DaynaPort E/LC, SI, SE	$285	$9
Nuvotech Nuvolink II	$219	$9
Shiva FastPath 5	$2089	$63
Sonic Ethernet TnT SE,II,LC,IIsi	$235	$7
Magic Networking Solutions		
MagicNet (localtalk)	$19	$1
Magic EtherNet	$199	$6

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TI microLaser
PS/17 $1319
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Apple StyleWriter	$439	$14
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QMS PS 815	$3999	$120
Dayna EtherPrint	$359	$11
GCC Laser Printers	Call	Call
JetInc. Deskwriter/Stylewriter Refill		$11.
Seikosha SP2000 Dot Matrix	$209	$61
We carry NEC, Abaton, Mictotek, & More!		

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Caere Typist Hand Scanner	$479	$14
MicroTek 1850 SlideScan	$1699	$50
UMAX UG-630	$1399	$49

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Quark XPress $489

System 7 $90

Aldus Gallery Effects	$239	$7
Claris Resolve NEW!	$289	$8
FileMaker Pro	$199	$6
Liaison	$269	$8
Microsoft Word	$271	$9
MiniCAD +	$499	$15
Mode32	$105	$4
Norton Utilities	$87	$3
PageMaker 4	$489	$14
PhotoShop 2.0	$569	$17
Soft PC/AT EGA Bundle	$329	$10
Symantic Anti Virus 3	$64	$2
Symantic Utilities Mac	$95	$3
Warner Beethoven CD ROM	$42	$1

Video Solutions

"For a good deal on 19-inch Ikegami...check out the MacProducts MagicView"- MacWorld Oct 91



MagicView 20" Trinitron monitor $2099

NEC MacSync 14" RGB	$419	$15
GoldStar 1450+ 14"RGB	$369	$12
Radius Color Pivot	$1399	$42
RasterOps 24 STV	$1289	$39
Seiko CM1445 14" RGB	$619	$19
Magic Video Solutions		
Magic 19 or 20"24-bit card. Block mode & accelerator compatible	$1299	$39
Magic 13" 8-bit color cd II	$269	$9
Magic 19" or 20" 8-bit card	$499	$15

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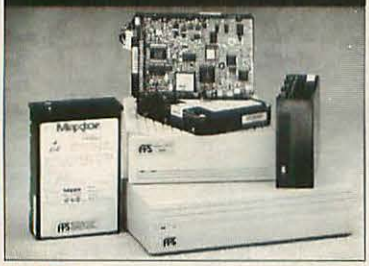
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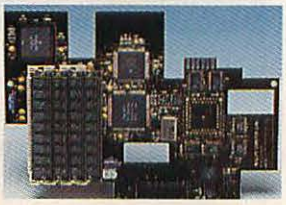
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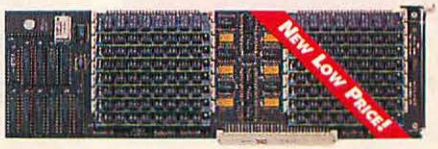
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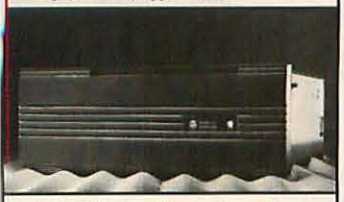
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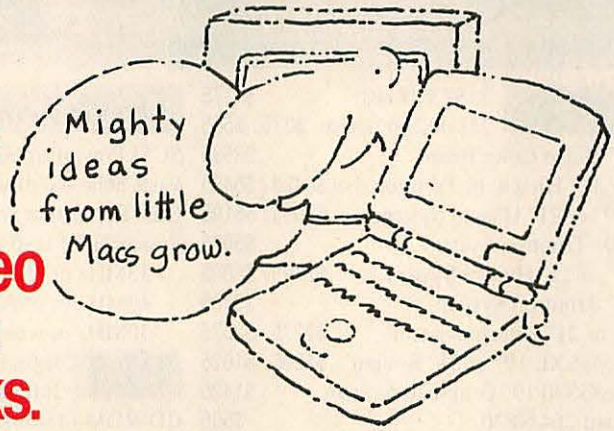
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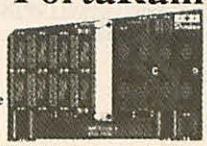
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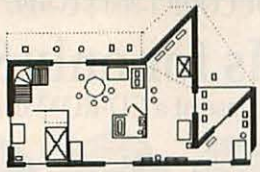
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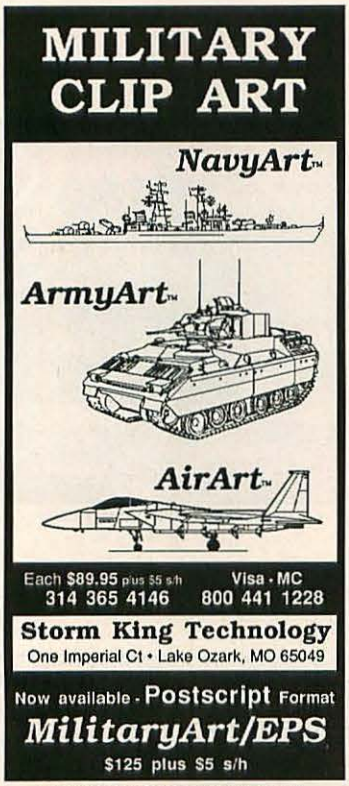
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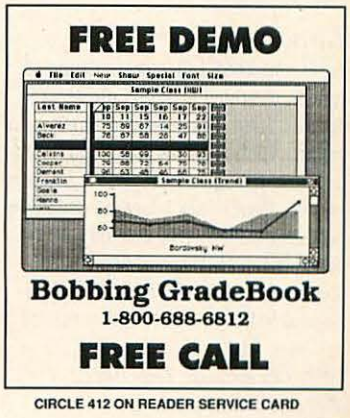


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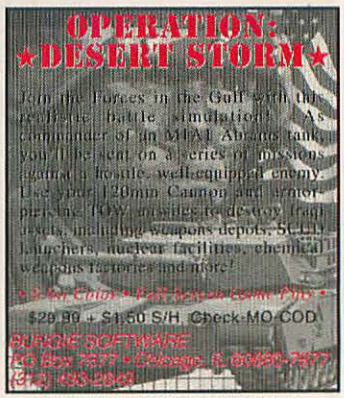
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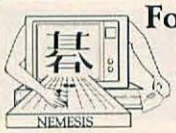


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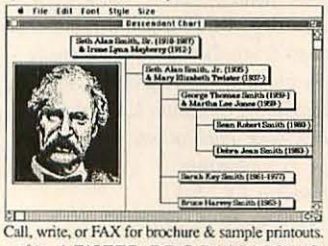
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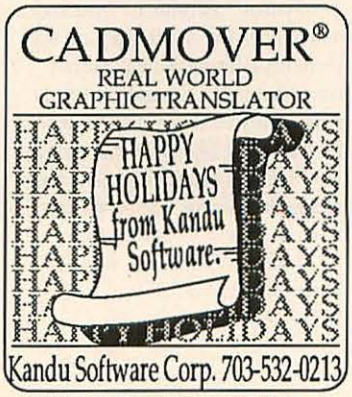


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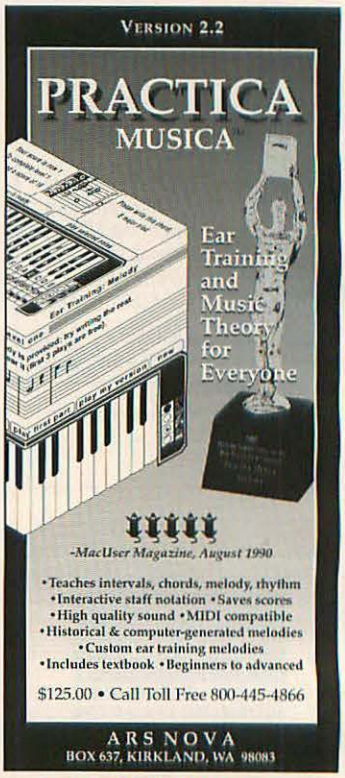
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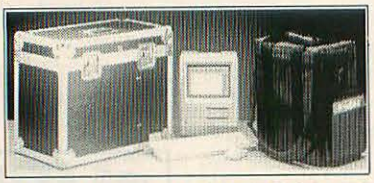
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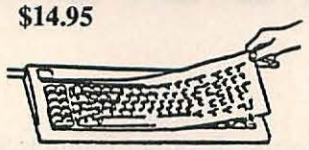


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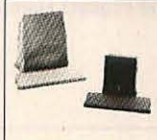
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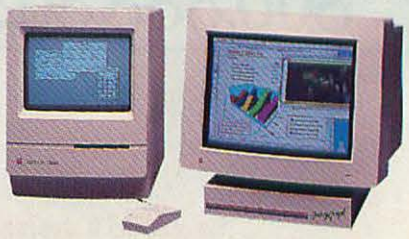


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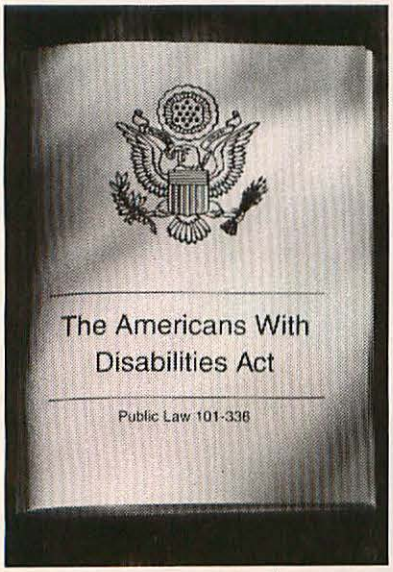


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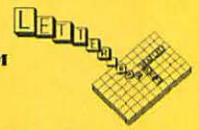


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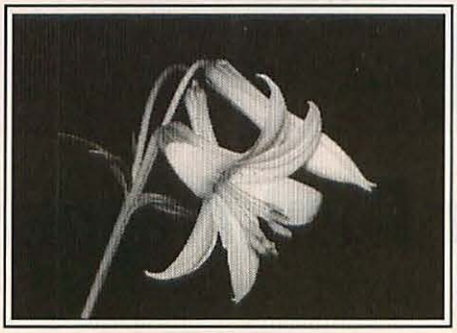
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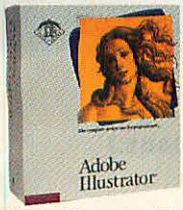


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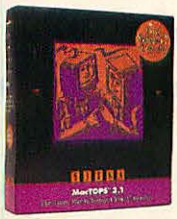

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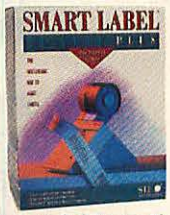
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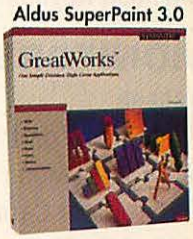
MacTOPS 3.1



Aldus SuperPaint 3.0



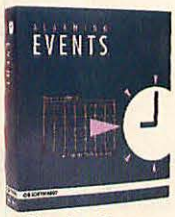
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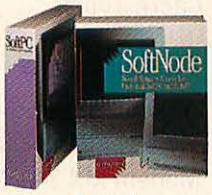
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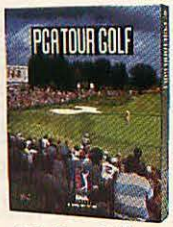
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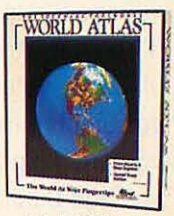
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Months on chart	Last month	This month		
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79	1	2	**Microsoft Word**	Microsoft Corporation
1	—	3	**Microsoft Office**	Microsoft Corporation
55	7	4	**MacWrite II**	Claris Corporation
32	6	5	**QuarkXPress**	Quark
56	—	6	**MacDraw Pro**	Claris Corporation
66	3	7	**Aldus PageMaker**	Aldus Corporation
31	9	8	**WordPerfect for the Macintosh**	WordPerfect Corporation
31	5	9	**FileMaker Pro**	Claris Corporation
24	10	10	**Adobe Illustrator**	Adobe Systems

EDUCATION SOFTWARE

13	3	1	**Where in Time Is Carmen Sandiego?**	Brøderbund Software
46	4	2	**Reader Rabbit**	The Learning Company
1	—	3	**Mavis Beacon Teaches Typing**	Electronic Arts
57	—	4	**Math Blaster**	Davidson & Associates
1	—	5	**The Playroom**	Brøderbund Software

ENTERTAINMENT SOFTWARE

24	2	1	**SimCity**	Maxis
9	3	2	**SimEarth**	Maxis
1	—	3	**Vette**	Spectrum HoloByte
2	—	4	**Wizardry**	Sir Tech Software
1	—	5	**Bridge**	Artworx

NETWORK/DATA COMMUNICATIONS

12	4	1	**White Knight**	FreeSoft
58	2	2	**TOPS**	Sitka Corporation
14	3	3	**Timbuktu**	Farallon Computing
16	5	4	**MicroPhone II**	Software Ventures
1	—	5	**QuickMail**	CE Software

MASS STORAGE*

Months on chart	Last month	This month		
1	—	1	**HD 60MB ZFP**	Cutting Edge
1	—	2	**HD 80MB ZFP**	Cutting Edge
1	—	3	**Bernoulli 90MB**	Iomega
4	—	4	**Infinity 40 Turbo (Removable)**	PLI
1	—	5	**45MB RCD (Removable)**	Cutting Edge

ADD-IN BOARDS

8	1	1	**Macintosh IIsi NuBus Adapter Card**	Apple Computer
1	—	2	**Ethernet Interface Card**	Apple Computer
3	5	3	**FastCache IIci**	DayStar Digital
1	—	4	**Macintosh IIfx Logic Board Upgrade**	Apple Computer
12	3	5	**Macintosh Display Card 8•24**	Apple Computer

UTILITY SOFTWARE

7	3	1	**After Dark**	Berkeley Systems
14	2	2	**The Norton Utilities for the Macintosh**	Symantec Corporation
20	1	3	**SAM II**	Symantec Corporation
1	—	4	**QuicKeys²**	CE Software
16	5	5	**Adobe Type Manager**	Adobe Systems

PRODUCT WATCH

Recent or forthcoming products of particular interest.

Hitchhiker's Guide to the Galaxy Expanded Book
The Voyager Company
HyperCard-based version of Douglas Adams's book designed for Macintosh PowerBooks

Metamorphosis Professional *Altsys Corporation*
Software converts character sets or lines of text to PICT and EPS formats

Paracomp Magic *Paracomp*
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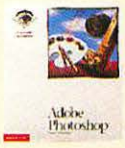
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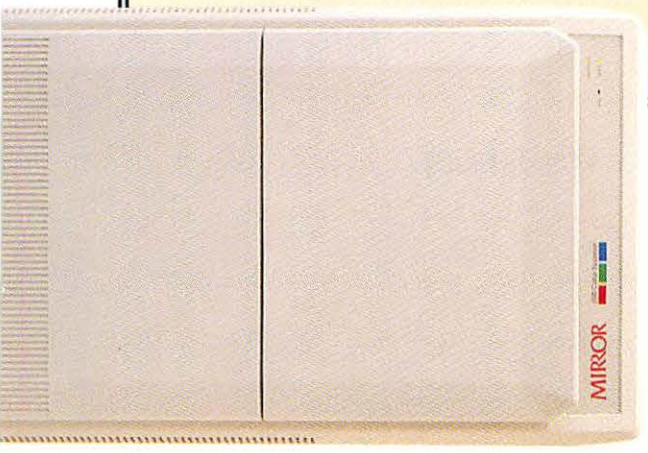
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The Mirror 600 Color Scanner offers an unbeatable combination of performance and value. With true 600 DPI scanning resolution, 8 1/2 x 14 scan bed and full System 7.0 compatibility, the Mirror 600 also includes the ***full release*** *version of Adobe Photoshop 2.0.*



10 Reasons To

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❶ Two-year warranty on all drives; One yea
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$899 19" Two-page Monochrome Display

The Mirror two-page monochrome display is practical and affordable, yet riv more expensive brands. Eliminate scrolling, squinting and get the workspace want at a price you can afford. Available for SE, Classic, LC, SE/30, and Mac IIs.

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NEW

The new Mirror Portrait Display is improved from top to bottom, with a combination of features no one else offers. This display plugs right into your Mac's built-in video port for a crisp, gray-scale view of a full page. Built to meet the strict Swedish standards for VLF and ELF emissions, and featuring built-in ADB ports to keep keyboard and mouse cables under control, the Mirror Portrait Display is an unequaled buy.*



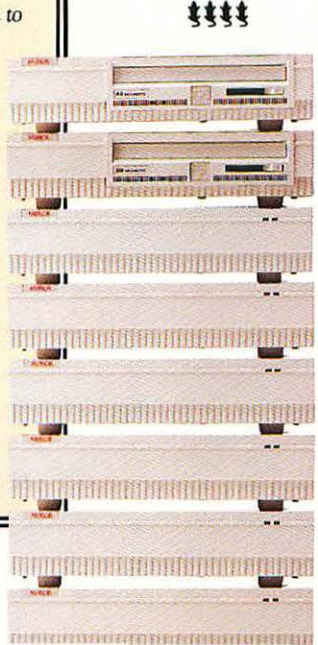
† for built-in video ports; call for other options.
*Except LC; Number of grays depends on CPU/Video board.

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If you think all hard drives are made the same, take a look at Mirror's. Our full range of zero-footprint fixed hard drives, and 44 and 88MB Syquest removable drives, are built with attention to the smallest detail.

HARD DRIVES	EXT.	INT.
30MB	$279	$229
45MB	$329	$269
50MB(Q)	$379	$329
80MB	$369	$299
105MB(Q)	$499	$449
210MB(Q)	$829	$779
330MB	$1299	$1199
425MB	$1499	$1399
1GB(S)	$2499	N/A
45MB Rem.*	$499	N/A
88MB Rem.*	$699	N/A
600MB Opt.*	$2499	N/A

(Q)-Quantum
* Price includes 1 cartridge





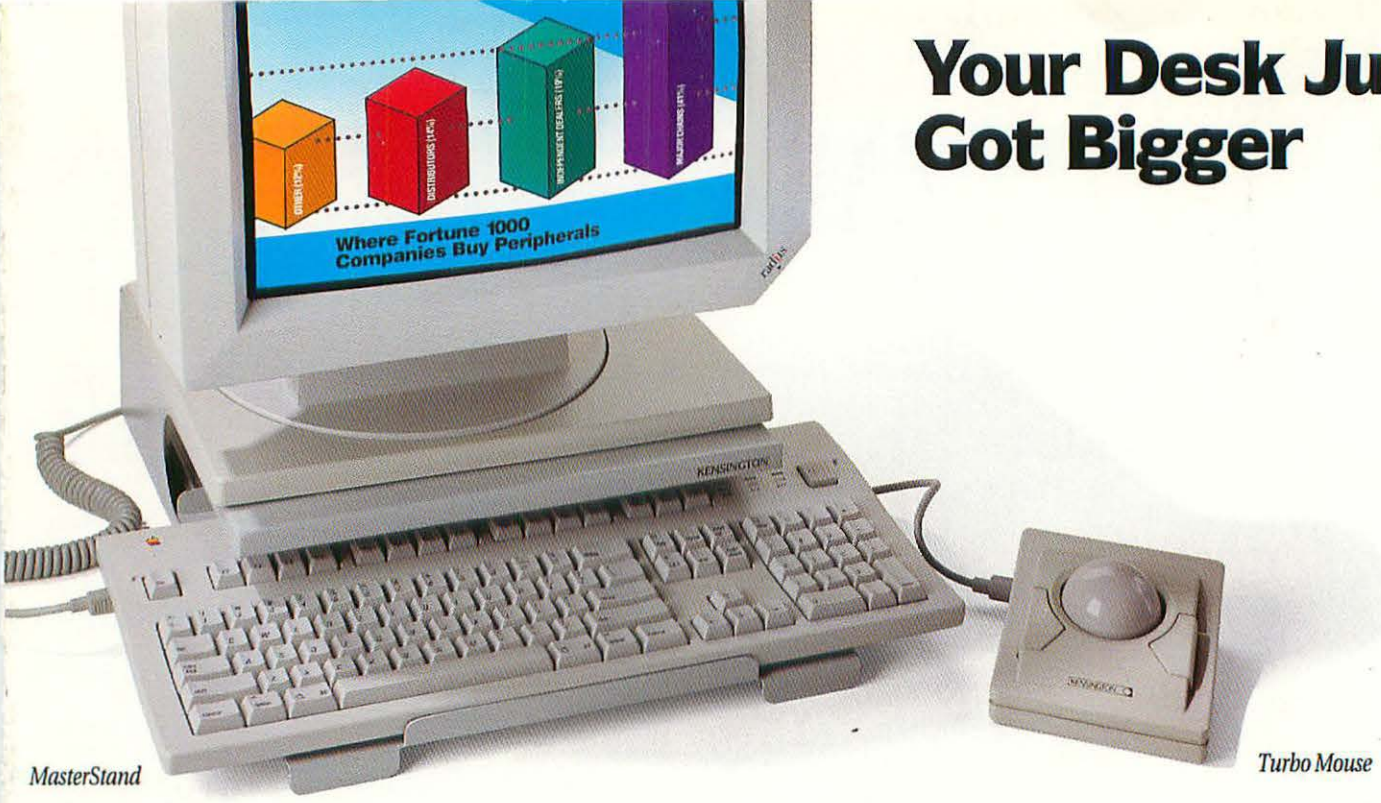
$299 45MB $349 80MB Portable Drives

The ideal storage solution for people on the go. The Mirror portable drives weigh only 2 pounds and fit easily into a briefcase. Despite their small size, the Mirror Portables are very rugged and offer full-size performance.

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For dot matrix printers, our *Space Saving Printer Stand* is the answer for maximum storage with a minimum footprint.



Space Saving Printer Stand

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